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AMERICAN GAS JOURNAL

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THIS LITTLE FIGURE

IS ALL SET TO BOOST THE SALES FIGURES OF MODERN GAS RANGES

You'll see him go to work in the pages of the SATURDAY EVENING POST

beginning September 21

Once again, ad after ad puts the story of Robertshaw before millions of women:

But the importance of the Robertshaw dial is presented more forcefully than ever before!

Each ad will carry the little Robertshaw robot figure shown above. He will spotlight the big contribution Robertshaw oven-heat-control makes to the range. He will be a symbol of cooking-freedom—a symbol all women will know.

When the gas range is equipped with Robertshaw, its oven performance is backed by Robertshaw standards of manufacture—its sales are backed by the force of Robertshaw national advertising.

ROBERTSHAW THERMOSTAT COMPANY
YOUNGWOOD, PA.

ROBERTSHAW OVEN-HEAT-CONTROL

PITTSBURGH EQUITABLE METER CO.

MERCO NORDSTROM VALVE CO.

MAIN OFFICES PITTSBURGH, PA.

NEW YORK COLUMBIA BUFFALO CHICAGO MEMPHIS KANSAS CITY PHILADELPHIA TULSA HOUSTON LOS ANGELES OAKLAND

AMERICAN GAS JOURNAL

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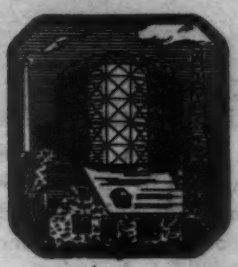

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In its 100th year—made of cast iron—the standard material for gas distribution mains

● Photographic proof of the long life of cast iron gas mains—an exposed 6" cast iron main in Boston's gas distribution system, part of the original line laid in 1836, none of it ever replaced. Cast iron pipe as made today with gas-tight mechanical joints and with improved methods of metallurgical control is an even finer product for gas service than cast iron pipe made a century ago. The Cast Iron Pipe Research Association, Thos. F. Wolfe, Research Engineer, 1015 Peoples Gas Building, Chicago, Illinois.

AS THE EDITOR SEES IT

"Public Service vs. Taxation."—A Survey by "Fortune."

DO YOUR customers complain about high gas bills? Do you know that they are probably considerably less satisfied with their tax bills?

"Fortune,"* in its July issue gives the results of a survey to determine what the average person thinks of his tax bills and his bills for electric and telephone service. It concludes that **the majority of people regard their bills for utility service as reasonable but consider their tax bills high.** In fact, about 10 per cent more persons complained about taxes than about charges by the utilities.

The results of the survey indicate that good public relations and a promotional type of rate are of more importance than a low rate in securing customer satisfaction. For example, 85.7 per cent of the people in Atlanta considered their electric bills "reasonable," yet the rates there are no lower than in some other places where the degree of customer satisfaction is much less. **It is highly significant that the Georgia Power Company, which serves Atlanta, was one of the first to adopt an objective type of rate.**

The survey will make profitable, though perhaps not pleasant reading for the politician. It looks as if taxation might well become a more popular issue than utility rates, holding companies or T. V. A.

"Fortune" is to be congratulated on its excellent work. We recommend that its survey on "Public Service vs. Taxation" be carefully read by every utility company executive.

A Healthy Gain in Gas Range Sales

A TOTAL of 482,500 gas ranges were sold in the country during the first six months of 1935 according to the Statistical Department of the American Gas Association. This was an increase of nearly 27 per cent over the corresponding period of 1934.

These figures are but a confirmation of encouraging news that has been reaching us from all over the country. For example: The Atlantic City Gas Company reports that for the first seven months of this year appliance sales were 200 per cent ahead of the same period last year; the Birmingham Gas Company had an increase of 53 per cent in gas refrigerator sales over a corresponding three months last year; the Brooklyn Union Gas Company in April, May and June had the best three months dealer business since the start of their dealer cooperation plan six years ago; the Gas Service Company of Kansas City, Mo., sold over twice as many gas appliances in July, 1935, as in July, 1934, and the Pacific Gas & Electric Company had an increase of 42 per cent in appliance business for the first six months of this year.

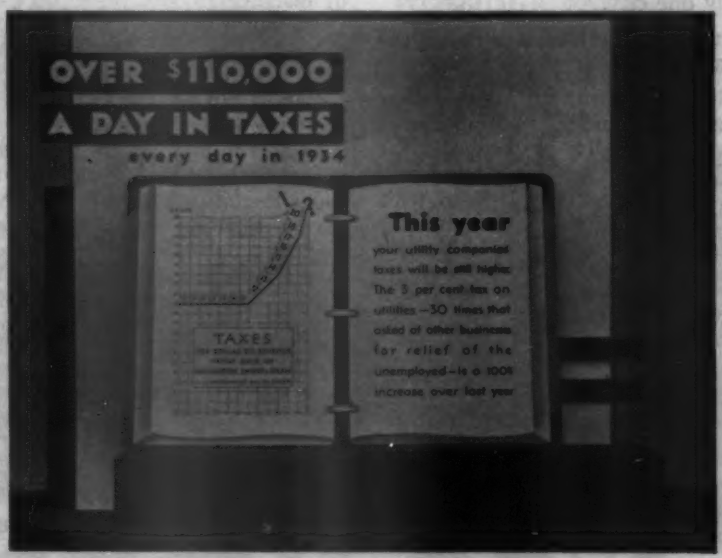
All of this is most gratifying and a clear indication that our industry is meeting successfully the competition which it finds on every side. The popularity and acceptance of gas seems definitely on an upward trend.

Not quite so encouraging are figures showing gas revenues for the first six months of 1935. These indicate a gain of 2.7 per cent over the corresponding period of 1934. The greatest increase was among commercial and industrial customers. For domestic customers using manufactured gas there was actually a slight loss.

How may these satisfactory appliance sales be reconciled with the very moderate gain in revenues? Undoubtedly the new appliances are more efficient. Perhaps the increased numbers on our lines have not had time to make themselves felt. Perhaps there is a trend toward less use of them. It is a situation which will bear careful future attention. High revenue per meter is a very important factor in making a gas company a financial success.

Dealer Cooperation—Will It Succeed?

AT A time when dealer cooperation is being discussed by the sales executives of every large gas company and many small ones, it may seem strange that we raise this question. Especially is this true when we publish in this issue the descriptions of several successful cooperative efforts in the sale of gas appliances. Our industry can point to a number of instances such as these. On the other hand, there are definite indications that many leading dealers still regard gas companies as unfair competitors rather than friendly allies; and some of us perhaps are not entirely above reproach. Can we change this attitude of the dealers? Are we willing



Window Display of Consolidated Gas Co. of New York

*"Fortune," 135 East 42nd Street, New York, N. Y. The survey is available in reprint form (25c).

to adjust ourselves to their problems, and go the whole way in helping them? Are we willing to look on the appliance business solely as a medium for increasing gas sales? If so, we may expect dealer cooperation to succeed, but not otherwise.

For years the gas company in each city did most of the local business in gas appliances. Dealers generally found it difficult to meet the prices, terms and allowances which gas companies were willing to make in their efforts to build up business; so dealers kept away from gas appliances or else handled only those which they could sell at low prices. Then we in turn complained of the "junk" they were putting on our lines; and the unhappy situation continued, and still continues in some places.

Manufacturers of coal, oil and electrical equipment have not been slow to realize the position of the dealer, and to help him in the distribution of their products. He became a booster for the pot stove hot water heater, for the coal or oil furnace and for all sorts of electrical appliances, including refrigerators and ranges. In short, he came to be a competitor of ours. Now we want him for an ally. We want him to sell gas appliances and be a booster for gas. We know that all of this is possible because of the splendid success of dealer cooperation plans in some places. But these results were not obtained by wishful thinking and talking. They were the result of studying the dealer's problems, of gaining his confidence and of making it both possible and attractive for him to sell gas appliances. Otherwise he would not have done so.

In any sale of a gas appliance under a dealer cooperation plan there are, apart from the customer, three vitally interested parties: (1) The manufacturer, who is responsible for the safety, efficiency, convenience and durability of the appliance; (2) the dealer who must sell and install it, and (3) the gas company which must service it, which usually must finance it and which must bear the brunt of any and all complaints about it.

The manufacturers of gas appliances have done their part and done it well. During this trying period of business uncertainty and depression they have made great progress in the improvement of gas burning equipment of all types. The number of them producing thoroughly first class appliances, approved by the A. G. A. Laboratory, is sufficient to permit a wide diversity among the dealers in any one city.

The real problem comes in the relations between the dealer and the gas company.

The dealer is generally a person or firm with rather limited capital. He is not an expert on gas appliances, nor does he usually have a large list of prospects for them. He sells what the public wants and what will yield him a good profit. Except as it may fit in with his other lines of merchandise, or his trade, he does not care whether an appliance uses coal, oil, electricity or gas. His profit comes from the sale of the appliance, not from the fuel or service which it uses. His purchases are apt to be relatively small and his stock somewhat limited. Finally, he cannot usually afford to accept time payments for what he sells. He is, in fact, a small merchant or contractor, with sometimes a trade in addition.

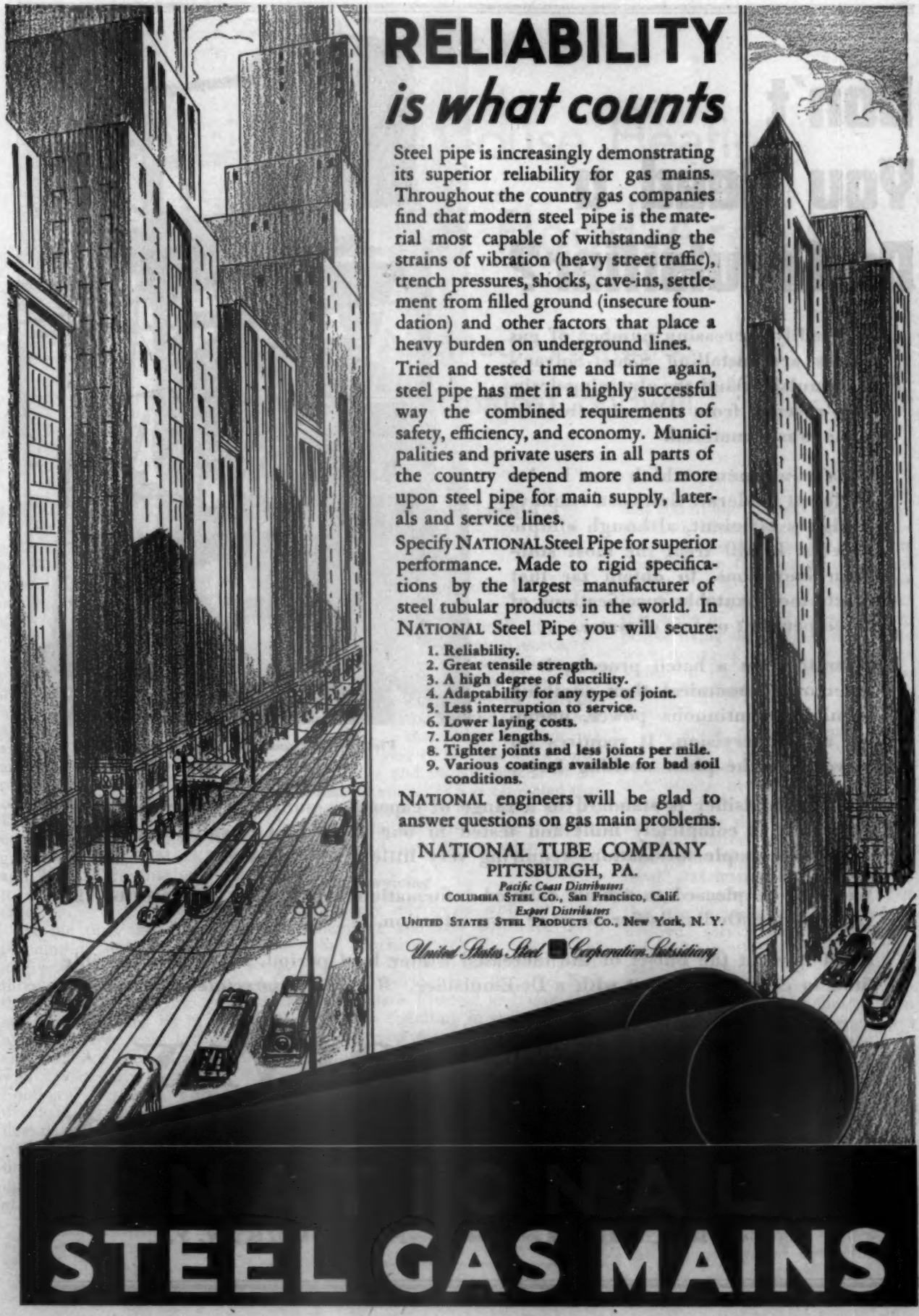
The gas company, on the other hand, is in a business requiring relatively large amounts of capital. It understands gas appliances and should have an extensive list of prospects for them. It can carry a large stock, can accept time payments and is known as a stable organization which can and will stand back of what it sells. The dealer is at a hopeless disadvantage; and unless the gas company will make sacrifices in order to gain the benefits of his good will and cooperation, then he will remain out of the gas appliance business.

One stumbling block comes from the fact that we are apt to confuse "Promotion Expense" with our appliance business. The former represents the cost of presenting to the public the advantages of gas over other fuels, with the object of generally maintaining and building up our volume of sales. It is properly classified as an operating expense. On the other hand our appliance business, which we carry on essentially to insure that the public can get gas burning equipment of efficient type, promptly and conveniently, should be comparable to that of a large dealer. But the appliance business gets involved with promotional activities. The appliance department is urged to cut prices and make allowances for old equipment in order to stimulate sales. Then it asks and gets large quantity discounts from the appliance manufacturer; and the dealer is unable to compete.

Dealer cooperation can be successful only where the dealer can sell appliances on a basis at least as favorable as the gas company, and the gas company will assist the dealer in following up leads and effecting sales. A few instances where the dealers even suspect the gas company of having taken one of their prospects are sufficient to counteract the work of months. The dealer must be given kindly assistance at every step,—in making contact with manufacturers, in understanding the appliances he sells and in financing deferred payments. If the gas company makes allowances for old equipment, this should be treated as a promotion expense and a similar allowance should be made through the dealer. The purchase of deferred payment paper by the gas company from the dealers is usually vital, and equitable plans have been worked out in a number of instances.

In return the gas company may reasonably insist that the dealer actively promote the sale of gas appliances, that it handle only those of approved type and that its prices be reasonable and fairly competitive with other cooperating dealers in the same district.

Cooperation involves the pooling of effort. It frequently means the giving up of certain advantages in order to gain others that are more important. Here we have a situation where we can acquire many allies who will help us to boost and sell our product; but we in turn must then look on our appliance business solely as a medium for increasing sales. Is it worth while? Those who have tried it seem to think so.



RELIABILITY *is what counts*

Steel pipe is increasingly demonstrating its superior reliability for gas mains. Throughout the country gas companies find that modern steel pipe is the material most capable of withstanding the strains of vibration (heavy street traffic), trench pressures, shocks, cave-ins, settlement from filled ground (insecure foundation) and other factors that place a heavy burden on underground lines.

Tried and tested time and time again, steel pipe has met in a highly successful way the combined requirements of safety, efficiency, and economy. Municipalities and private users in all parts of the country depend more and more upon steel pipe for main supply, laterals and service lines.

Specify NATIONAL Steel Pipe for superior performance. Made to rigid specifications by the largest manufacturer of steel tubular products in the world. In NATIONAL Steel Pipe you will secure:

1. Reliability.
2. Great tensile strength.
3. A high degree of ductility.
4. Adaptability for any type of joint.
5. Less interruption to service.
6. Lower laying costs.
7. Longer lengths.
8. Tighter joints and less joints per mile.
9. Various coatings available for bad soil conditions.

NATIONAL engineers will be glad to answer questions on gas main problems.

NATIONAL TUBE COMPANY
PITTSBURGH, PA.

Pacific Coast Distributors
COLUMBIA STEEL CO., San Francisco, Calif.
Export Distributors
UNITED STATES STEEL PRODUCTS CO., New York, N. Y.

United States Steel Corporation Subsidiary

STEEL GAS MAINS

Don't You Need a De-Emulsifier?

A steadily increasing number of gas plants are installing Semet-Solvay's De-Emulsifier and are obtaining desirable revenue from otherwise troublesome waste material.

This equipment, which can be installed at moderate first cost, employs a highly efficient, although simple process. It will treat the most stubborn emulsions, to obtain tar that meets merchantable specifications of three per cent or less of water.

Operating on a batch process, it is far more economical than anything requiring continuous power, pumping and supervision. It requires no increase to the plant working force.

View of De-Emulsifier, showing treatment tank before being insulated.

The De-Emulsifier is standard in a range of capacities, suited to large and small output. It is completely built and tested in our shops and is shipped ready to mount on simple foundations requiring very little ground space.

We shall be pleased to submit detailed information and furnish estimates on the value of the De-Emulsifier to your own situation.

Right now, at the outset of the increased winter load period, is the best possible time to equip your plant with a De-Emulsifier. *We shall appreciate your inquiry.*

SEMET-SOLVAY ENGINEERING CORPORATION

Engineers — *Contractors*

40 RECTOR ST. NEW YORK, N. Y.

AMERICAN GAS JOURNAL

SEPTEMBER 1935

Servicing Gas House Heating Installations in Flood Area

Program Adopted Promotes Customer and Dealer Goodwill

By Harold Jansen

HIGHLY satisfactory results in the sale of gas house heating equipment, from the standpoint of both the dealer and the utility, have been obtained from a co-operative merchandise sales program in the Empire-New York group of utilities in Central New York.*

This co-operative plan has been under way for more than three years in the city of Ithaca, where it was first tried out. In 1933, after the inauguration of natural gas service and resulting cheaper rates in Ithaca and Cortland, great efforts were placed on the sale of gas house and commercial heating there. Late in 1934 natural gas was piped to the other cities in the Empire-New York group—Geneva, Auburn, Newark, and Penn Yan—making it possible to stress gas house heating in these cities.

At the time this summer I was planning to make a survey of the utility-dealer co-operative setup, three of the communities served by the Empire-New York group had recently been hard hit by a flood in which 47 lives were lost and property damage estimated at $25,000,000 was caused in 11 counties in the Southern Tier New York area. I decided to go to Ithaca, the most devastated of the Empire-New York cities served with gas, and get a first-hand glimpse of the dealer co-operative picture from the plumbers' standpoint, in relation to the sale of gas house heating and commercial equipment.

W. F. Moses of the Empire Gas and Electric Company, Geneva, N. Y., head of the new business department of the utility group, had previously revealed to me that the co-operative plan in the territory had resulted in the sale or lease during the past year of 689 gas house heating units and 96 commercial or industrial units. It was estimated that these installations had added $89,400 in annual revenue to the company through increased gas sales.

Free Servicing

In my interviews with the three plumbers and one hardware store that concentrate on the sale of gas heating, I found them greatly impressed by the fact that the New York State Electric and Gas Corporation operating in their city had volunteered to service free of charge all burners and furnaces which were damaged by flood waters.

A survey by the utility revealed that 200 of the 500 gas furnaces installed in Ithaca homes had been affected by the flood, and 50 more in Cortland, another property served by the New York State Electric and Gas Corporation. It was discovered that some of the furnaces of those people living on Ithaca's three hills were damaged, as well as those installed in the "downtown" section, where the flood did its greatest destruction.

The utility estimated that 95 per cent of the damaged units were conversion burners, some of them leased and others owned by the householder. It was decided that every gas customer should be treated alike in the matter of repair service, whether he owned his heating equipment, was leasing it, or paying for it on a time basis. The utility felt that the consumer was entitled to five-year service on his equipment, especially in the view of the fact that the calamity was "An act of God." While it was with some reluctance, the officials admitted, that the expensive repair program was adopted, they felt that it would be returned in customer and dealer good will.

In many instances it was found necessary to reset the burner. Motors had been soaked by the flood waters, and had to be dried out. Fiber parts of the burner had to be replaced. In areas where there was mud and silt in the cellar, the burner had to be removed, washed, and the orifices cleaned out. In some

Utility-Dealer Cooperative Plan has been in effect for over three years in Ithaca, N. Y. Important features of the plan from the dealers' viewpoint are included in this story.

** Detailed description of this plan appeared in February, 1935, issue of American Gas Journal.*

cases it was necessary to put in new parts. When the job was complete, the burner was put through a rigid test to make sure it was okay.

Within two days after the flood in Ithaca, a temporary shop equipped with a drying furnace and test bench, with air and oil spray for cleaning, was set up in the old manufactured gas plant.

Although none of the gas heating plants in the homes and business places were in use, the householders in many cases called to report the condition of their burners. The survey of the area was immediately started. The injured parts were brought into the shop, completely overhauled, put through a rigid test to make sure they were in first class condition, then installed, and retested.

The repair men dropped everything else, and went to work on this particular servicing job, completing it in four weeks. Six men were used on this work. As the calls from the consumers came in, they were told that the service men were doing the job by streets, and that they (the customers) would be taken care of soon.

The New York State Electric and Gas Corporation found that most of the expense was for labor, as it was able to salvage most all the parts.

The furnaces, when placed back into good working order, were used by the home owners in drying out the cellars, making additional revenue for the company.

The customer was naturally very much pleased with the service, along with the plumbers who had sold them the equipment.

Dealers' Opinion

In making the rounds of the four dealer house heating outlets, I talked with James P. Donohue, president and treasurer of Donohue-Halverson, Inc., plumbers.

"What do you think are the important features of the utility's co-operation plan? What do you think of the program in relation to the successful merchandising of gas heating equipment?" I asked Mr. Donohue.

"I can outline several phases of the plan which appeal to me, and which have made our organization entirely in accord with the plan's system of operation," Mr. Donohue replied.

"The utility has a staff of salesmen who are assigned to territories within the city. The salesman keeps in constant touch with the gas consumers in his territory, and when the latter are contacted, it is the policy of the sales representative to inquire with whom the customer is accustomed to dealing when purchasing gas equipment.

"As a general rule, this system works out very well. The tendency is to give the plumber or other gas house heating dealer the benefit of the sale, since the salesman is compensated on the volume of business done in the territory he presides over, whether the dealer makes the sale or he does.

"If the gas consumer does not care from whom he purchases house heating equipment, the salesman may hand the prospect to all of the dealers and give them each a crack at it.

Card Index System

"The heart of the plan is the card index system, which means that if I run across a prospect, I file a card in the utility office, stating the type of equipment the prospect is interested in, his name and address, and other details. Then the utility company can only work with me on the sale for the next 30 days. This does not prevent another dealer from contacting the prospect also, but the utility co-operates only with the dealer who filed the card.

"The utility runs advertisements regularly in the newspapers stressing the advantages and economy of heating a home by gas. We are informed beforehand when the advertisement will occur, and are invited to tie in with our own advertising featuring a definite make of burner.

"The utility salesmen come to us with offers of assistance in decorating windows. We find it advisable to have a house heating equipment salesman, since the more co-operation we give the utility, the more we can expect and get in return.

"In addition to the utility's salesmen who concentrate on house heating, there is a commercial man whom we contact in case we find a business place interested in gas heating. The utility's house heating salesmen drop into our store daily. They offer to go out with our salesmen and assist in making the sale.

"The utility company's gas heating engineer makes a measurement of the home and the number of openings, and figures the approximate cost of heating the building. One thing that has greatly impressed us is that the estimates of the cost of heating a home by gas, made by the utility's engineer, have run very close to the actual expense. This means a satisfied customer.

"The utility has an attractive rental plan that the customer wishes to try in most cases. If he buys at any time within six months the full amount he has paid in for rental is applied on the purchase price. If he signs up within six months and a year, he gets 80 per cent credit forthe amount paid on the lease. The credit then goes on a sliding scale—two years 70 per cent, three years 60 per cent, four years and more, 50 per cent.

"I estimate that we have installed 200 gas heating jobs since the beginning of the dealer co-operative plan. Eighty per cent of them were originally leased, and then contracts given for the sale. In addition to the home jobs we have installed, we have sold or leased unit heaters to barber shops, restaurants, a grocery store, and the bus terminal.

"Very few customers have had their gas heating equipment removed, and the few that did explained it was because of lack of ability to pay for it, rather than to any fault of the equipment, the utility company, or ourselves.

"Our success with gas house heating in this city of approximately 21,000 people has been due partly to the installation of natural gas lines here three years ago. The rates during the manufactured gas period were prohibitive.

"The dealer co-operative plan breaks down a lot of sales resistance that the utility might have if it were competing with the dealers. Many people like to trade better with the dealer than they do in the utility, for one reason or another.

"I am an enthusiastic booster of the way the utility co-operates with dealers, and believe that if the program were carried out in more cities of the country, there would be much better harmony between the utility and the plumbers which would result in increased financial returns to all."

Salesmen's Assistance

Edward H. Woods, proprietor of the Higgins Plumbing Company, told me there had never been any controversy with the utility over house heating equipment sales. The salesmen of the New York State Electric and Gas Corporation had never competed with them in trying to make a sale, but instead were glad to do all they could to aid them to get an installation, Mr. Woods stated.

"The gas company's salesmen drop in every day to see if we have

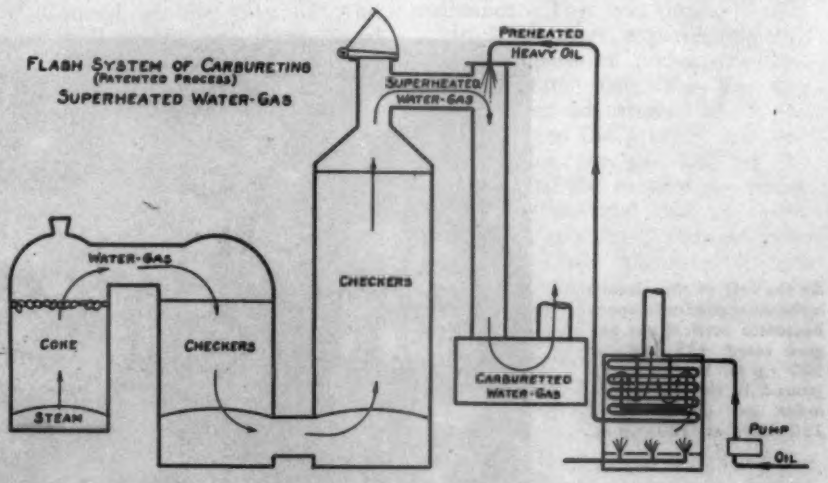
(Continued on page 46)

Flash System Of Water-Gas Carbureting Using Heavy-Oil

By THEODORE NAGEL
V. P., and Chief Engineer, Carburetted Gas, Inc., New York

THE flash system of carbureting effects substantial economy in the quantity of heavy oil required for water-gas enrichment through increased yield of fixed gaseous hydrocarbons. the result of inhibiting polymerizing reactions, to practically eliminate the production of light oil and tar condensates.

In the current practice of generating carburetted water-gas the enrichment oil, atomized into the water-gas flowing into the top of the carburetor, is cracked to gaseous hydrocarbons by the thermal energy transferred to it while flowing through the carburetor and superheater chambers. Owing to the continually falling temperature and the prolonged heating period, during which polymerizing reactions take place, a substantial part of the enrichment oil is converted to light oil and tar condensates.



The continually varying temperatures of the carburetor and superheater throughout the "blow" and "make" cycle are shown by temperature chart in a report prepared for the annual meeting of the Michigan Gas Association, June/July, 1931, by E. S. Pettyjohn, Department of Engineering Research, University of Michigan.

In the current cyclic operation it is recognized by gas operators that the carburetor and superheater fail to supply the thermal energy required to crack the quantity of heavy oil currently used for enriching water-gas to public utility thermal requirements.

Even Temperature Carbureting

As the temperature zone, in the order of 1500° F., required for carbureting water-gas is much higher than the temperature zone, in the order of 900° F., used in oil refinery practice, co-relation of the variable factors of heat-intensity and time-of-contact for cracking oil in the gas making higher temperature zone, of little interest in refining oil, has heretofore received scant attention of hydrocarbon technologists.

Cracking oil to fixed gaseous hydrocarbons enrichment of lean gas support the results of research in the gas making high temperature zone and confirm maximum gas enrichment from oil can be obtained through definite operating control of the thermal energy requirements and demonstrate that this control can be successfully and economically applied to commercial production of carburetted water-gas through the flash system of carbureting, a patented process.

The flash system of carbureting is based on the interrelated factors of time and temperature for the thermal energy transfer necessary to convert substantially all of the oil hydrocarbons to fixed gaseous hydrocarbons enrichment of lean gas in order to inhibit the formation of condensates (light oil and tar) which are largely polymerized secondary reaction products resulting from prolonged heating of the lighter weight diolefins originating as primary cracked products.

The flash system of carbureting lean-gas, with oil heavier than gas-oil, operates at practically even temperatures and overcomes the current practice of prolonged heating, over-cracking and under-cracking so as to produce substantially uniform quality enrichment and practically eliminate the formation of light oil and tar condensates. Carbon deposit fouling of the carburetor and superheater chambers and the checker brick periodic renewal operations of the current system are eliminated by the flash system of carbureting.

In the operation of the flash system of carbureting, a part of the thermal energy required for converting oil to fixed gas is supplied to the liquid oil which is heated while subjected to superatmospheric pressure and flowing through a pipe coil heater so that the heat flashes the oil into vapor upon releasing the pressure. The remaining part of the thermal energy required for converting the oil vapor to fixed gas is obtained from the water-gas which is superheated to practically an even temperature in substantial excess of its carbureting temperature and this excess heat supplies the thermal energy deficiency to the oil vapor through convection by diffusion upon flashing the hot oil into the superheated water-gas as it flows from the outlet of the superheater. The water-gas and oil vapor instantly attains an even carbureting temperature to instantly crack the oil into a uniform quality enrichment gas.

The standard three shell carburetted water-gas machine containing checker brick in the carburetor and superheater chambers is used and the water-gas is superheated to a fairly even temperature without the customary atomized enrichment oil flowing through the carburetor and superheater chambers.

The annual saving in oil to be effected by the use of the flash system of carbureting can be computed for local gas operations from data given here as an example:

"American Gas Practice," 1931, by Morgan, page 570, cites 2.95 to 3.55 gallons gas-oil used per thousand cubic feet 550 B.T.U./C.F. carburetted water-gas, an average of 3.25 gallons gas-oil.

Enriched by the flash system, using oil heavier than gas-oil containing 12 per cent hydrogen, 2.67 to 2.90 gallons heavy oil would be used.

Obtaining greater conversion of oil to gas and using lower cost enrichment oil, other production cost economies effected by the flash system of carbureting are obtained through eliminating operating expenses for

A. Recovery and handling light oil and tar condensates.
B. Removal of oil carbon from the carbureting chamber.
C. Periodic shutdown and checker brick renewal.

The uniform quality gas produced by the even temperature flash carbureting of superheated water-gas cannot be produced by the continually falling temperature system currently in use.

Comparing the annual cost of enrichment oil for one million cubic feet gas average daily output:

Operating the standard cycle with gas-oil, costing 4 cents per gallon delivered, the annual cost of the gas-oil will be

$365{,}000 \times 3.25 \times 0.04 = \$47{,}450.$

Operating the flash system of carbureting with heavy oil, costing 3 cents per gallon delivered, the annual cost of the heavy oil will be

$365{,}000 \times 2.90 \times 0.03 = \$31{,}755,$

which is 67 per cent of the annual cost of the gas oil.

Gas Engine Effects Great Saving for Knitting Mill

CAN a change from purchased power to gas-engine-generated power cut kilowatt costs substantially? Ask the Amazon Knitting Company of Muskegon, Michigan! In 1920 this firm installed two vertical gas engines at a total cost of $55,000. By October, 1934, the saving over the former purchased power totalled $115,000—twice the original cost of the engines. Having doubly paid for themselves in five years, these engines are now earning additional profits for the knitting company.

In the period from August 1, 1929, to December 21, 1933, both the volume of gas used and the amount of power produced by this company's gas engines increased greatly. However, in 1933 less cubic feet of gas were required per kilowatt than in 1929. The following table, extracted from actual power cost records of the Amazon Company, shows this clearly.

	1929	*1933*
Cu. ft. gas used	6,421,200	25,172,300
KW. produced	421,500	1,948,600
Cu. ft. gas per kw.	15.23	12.4

Also, over this four-year period, power costs per kilowatt were reduced from $.0087 to $.0056. This table is likewise from actual operating records.

	1929	*1933*
Cost of gas per kw.	$.0046	$.0044
Cost of oil per kw	$.0007	$.0007
Cost of repairs and mech. labor per kw.	$.0034	$.0005
Total Cost per kw.	$.0087	$.0056

The indication is that, in this case, the greatest factor in the reduction of power costs was the decrease in repair and maintenance cost per kw.—a clear cut of $.0029 per kw. for the period.

At the left of the picture is the six-cylinder Cooper-Bessemer vertical gas engine rated 435 H.P. at 300 r.p.m. In the background is the three-cylinder gas engine rated 220 H.P. at 300 r.p.m.

The Sliding Scale Rate Plan of the Washtenaw Gas Company Ann Arbor, Michigan

By Staff Correspondent

This plan provides for a guaranteed return on the investment of the company, for the fixing of the rate by the company and for the division of any profits above the guaranteed return between the company and its customers on a predetermined basis. A block form of rate with a service charge is specifically provided for, the service charge being treated as a credit to operating expense rather than a part of the gross revenue. The plan contains many features which might well be applied elsewhere.

"On March 5th, 1917, the Common Council of the City of Ann Arbor, Michigan, passed an ordinance granting a new franchise to the Washtenaw Gas Company and repealing an ordinance passed September 2nd, 1889."*

"Section five of the franchise names rates and discounts which may be charged and allowed by the company for gas service. This section also provides as follows: 'At the instance of either party hereto, a rate revision under this franchise may be had at any time, said rate revision to be made by a Public Utility Commission if one is in existence in the State of Michigan at said time. If a Public Utility Commission does not then exist, said rate revision shall be made by a commission to be created as follows: The Council of the City of Ann Arbor shall appoint one member and the Gas Company shall appoint one member and a third member shall be appointed by the Justices of the Supreme Court of the State of Michigan.'

"Almost contemporaneously with the passage of this ordinance, the United States entered war with Germany, and before January 1, 1918, the date set for the going into effect of the new ordinance and rates, labor conditions, the cost of coal and the price of all supplies had so changed as to cause the Washtenaw Gas Company at once to request the appointment of a commission to consider and revise the rates under the provisions of section five of the ordinance."

Accordingly a commission was appointed. In its report, filed July 1, 1918, it recommended that a sliding scale rate plan be substituted for the rate provisions contained in the 1917 ordinance. This was done.

"In 1920, after experiencing two years of operation under this flexible gas rate plan, the company asked for an adjustment of the relation between the primary and secondary rates for gas and of the proportion of the surplus shared between the consumer and the company in its relation to the net price of gas. This modification was made by mutual agreement in August, 1920, between the City and the Gas Company.

"In 1925, the Gas Company, after experiencing a further period of five years of operation of the rate plan, asked for a modification of the minimum guaranteed return to the company, the inclusion of certain capital values which had been excluded by the Gas Rate Commission in 1918, and for several minor interpretations of the original commission's instructions of procedure to clarify disputed points."

An agreement with respect to these latter changes was likewise reached.

Thus the plan in its essentials has been in operation for seventeen years and is reported to have worked out very well up to 1929. From that time on the company has not earned the guaranteed rate of return due to decreased gas sales. While the plan would permit the company to increase its rates to a point where it could make the allowed return, it has considered it unwise policy to do this under present business conditions. This, however, is no reflection on the fundamental soundness of the plan.

Object of the Plan

In adopting a new rate plan in 1918 the Commission had in mind the following ends as being desirable of attainment:

"(a) A flexible system of rates which could be adjusted up or down to meet the charging conditions materially affecting operation. Such a system, if properly determined, should obviate the frequent appointment of commissions for revision under the terms of the franchise.

"(b) Provision for a reasonable return to the company at a reasonable cost to the consumer during the periods when costs are high, but which will make it advantageous to the company to reduce the rates as conditions became normal. In other words, the Commission has sought to determine a system which would give the company a larger return and a greater percentage of profits as the rates for gas are decreased."

To secure these ends it made use of the basic principles of the so-called London sliding scale, which it aptly referred to as "an automatic and interdependent adjustment of the price of gas to the consumer and

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* *Quotations are from Reports of the Commission for the Revision of the Rates of the Washtenaw Gas Co., dated July 1, 1918, and November 16, 1925, respectively.*

the rate of dividends to stockholders whereby, for every decrease or increase in price of gas, the stockholders are permitted an increase in the rate of dividend on stock issued. It rests on the theory that the desire of stockholders for greater dividends will prove a stimulus to increased skill and efficiency in management.

"To apply this scale there must be established a base or standard price of gas, a base rate of dividend, and a ratio upon which the increase or decrease in price shall affect the rate of dividend. There must be no means of distributing profits except through dividends, and there must be no dividends that are not dictated by a sound business policy."

Valuation

The Commission in 1918 prepared a complete inventory of the gas company property and valued it on the basis of average prices prevailing from 1910 to 1915. Since 1918 additions have been carried at actual cost.

The 1918 appraisal contained no item for going concern value. In 1925, however, the Company and the City agreed to an arbitrary addition of $150,000 (about 14 percent of the book value of the physical property) to cover going concern and added physical value due to changed price conditions.

The allowance for working capital is fixed at 5% of the property value exclusive of stores, supplies and merchandise.

"The total capital investment upon which a return shall be taken shall be that shown in the inventory and appraisal of the Gas Rate Commission made as of January 1, 1918, plus additions to capital made since, including the added property values and the going concern value agreed to between the Gas Company and the City, and plus the working capital (taken at five per cent upon such value), plus the amount of stores and supplies and merchandise as of December 31st of the year in question."

Guaranteed Return

In 1918 the base or guaranteed rate of return was fixed at 5 percent. In 1925 this rate was raised to 6 percent.

"This provision becomes a virtual guarantee of such return to the Company. No matter what conditions prevail the Company is to have a rate which will care for its operating costs and produce this minimum return on its capital investment. One purpose of providing this guarantee is to insure the ability of the Company under all circumstances to maintain the integrity of the property of the utility, its improvement and extension as the public demand may require, and to protect its bond holders."

Rates and Division of Surplus Earnings

As a general policy the rate schedule contains a customer charge of 30 cents per meter per month. This is handled as a credit to distribution expense rather than as a revenue item.

The commodity charge contains a primary rate for the first 5000 cubic feet per meter per month and a secondary rate 20 cents per thousand cubic feet lower for all excess.*

The original schedule for the division of earnings in excess of the guaranteed return was modified by the Michigan Public Utilities Commission in 1921 and again in 1925 by agreement between the Gas Company and the City. This latter schedule, which is still in effect, is as follows:

Primary Rate (Net)	*Secondary Rate (Net)*	*Company's Share of Surplus Earnings*	*Consumers' Share of Surplus Earnings*
$1.05	$ .85	100%	0%
1.10	.90	90	10
1.15	.95	80	20
1.20	1.00	70	30
1.25	1.05	60	40
1.30	1.10	50	50
1.35	1.15	40	60
1.40	1.20	30	70
1.45	1.25	20	80
1.50	1.30	10	90
1.55	1.35	0	100

"It will be readily seem from the foregoing table that there is no incentive held out to the company to increase the rates above such as will produce the insured return, while every inducement exists to lower the rates in order to secure the larger percentage of net income.

"It is to be noted that under the plan of flexible gas rates that when the yield from the sale of gas at a rate selected by the company does not provide sufficient funds to meet operating costs and the insured return on the investment, the gas rate shall be increased by the company to such an amount as will provide these sufficient funds, but at the end of the year a careful accounting shall be made and the surplus (net income) over the operating costs and insured return shall be divided between the company and its consumers. It should be noted that the controlling principle of this division is that the higher the rate for gas charged in accumulating this surplus the greater proportion of that surplus is returned to the consumer."

Computation of Surplus Profits

"Gross revenues shall be considered as all revenues accruing to the company from the operation of their properties in Ann Arbor," except revenues from the sale of by-products and from the customer charge which are handled as credits to operation.

From the gross revenues are deducted the usual operating expenses, a definitely specified allowance for renewals and replacements, all taxes and the guaranteed return on the investment.

"The total amount of money distributable to the consumer shall be apportioned among the individual consumers by first obtaining the percentage which the amount bears to the actual total income from gas sales and applying this percentage to the total annual amounts of the payments made by the individual consumer for gas during the preceding year, and shall be distributed within ninety days after the close of the year. The service charge shall be excluded as an item of the "Income from Gas Sales" for the purpose of this distribution.

"The amount so obtained for each consumer who is taking gas at the end of the year may, at the option of the Gas Company, be paid with the company's check sent out by mail to the last known address or be paid in cash at the office of the company. The mailing of such checks by the company to such last known address shall constitute a legal payment of such refund to the consumer; or when the company shall have determined the amount

(Continued on page 44)

** Four competitive reasons the present rates of the company do not conform exactly to this provision. They are:*

Service charge—$.30 per meter per month.

Commodity Charge

First 2,000 cu. ft.	$1.20	per M.
Next 3,000 " "	1.10	" "
" 5,000 " "	.95	" "
" 5,000 " "	.85	" "

Etc.

These rates are net and are subject to a penalty of $.25 per M. for delayed payment.

Gas Pressure Controls

Excess Diaphragm More Uniform on All Sides When Material Has Been Blocked. Note Creases on Section Between Flanges Common on Leather Diaphragms.

INSTALLATION OF LINE REGULATORS

Part IV

By
Erick Larson

Gas Engineer, Long Island Lighting Co., New York

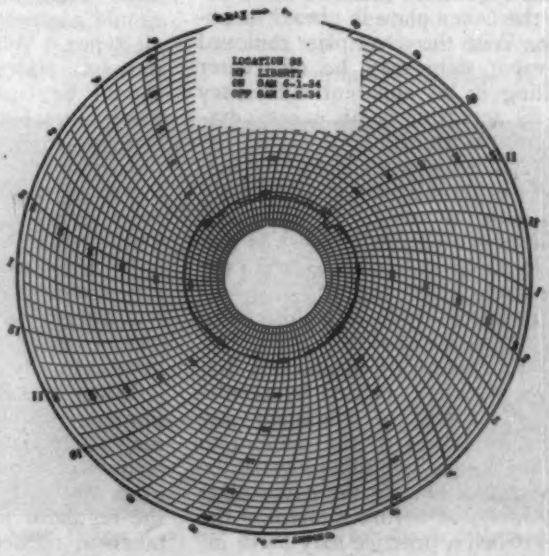
INSULATION of inlet lines is sometimes resorted to as a means of preventing freezing, by retaining as large a quantity of heat in the gas as possible before it is passed through the regulator. Where the gas fed into the regulators is direct from storage tanks located in close proximity to the regulators the gas will be close to atmospheric temperatures and insulation would have no value. The temperature of gas in transmission mains will on the average be higher than that of the atmosphere during the colder months of the year and insulation will preserve the entrained heat. It is important to remember that the purpose of insulation is to prevent the transfer of heat between the two mediums it separates which is not always desirable in regulator practice. Due to the expansion of the gas through the valves the temperature of the gas on the outlet side of the valves may always be lower than that of the atmosphere immediately adjoining the regulator body and for that reason heat will always be traveling from the atmosphere through the regulator body into the gas stream on the outlet side of the valves and no insulation should be installed which would prevent such transfer of heat taking place. Considering only the period of the year when frost in a regulator causes trouble, insulation should be installed on the inlet lines and regulator body only when the atmospheric temperature is generally lower than the inlet gas.

The valve discs and diaphragms of regulators are the working parts subject to the most severe service. While these parts have been known to endure for many years, the cost of material and labor involved in periodically changing such parts is small considering the safety factor involved. Local conditions govern the period of the change but ordinarily a term in excess of one year would not be recommended. With the selection of a year as a period, the work of repair may be done during seasons when other work is at a minimum.

Specially Trained Repair Men

Regulator repairs are of such a nature that every man can not be expected to display the skill and understanding required to perform the work in a manner which will assure both proper functioning and lasting qualities especially of the diaphragm. Special men should be trained for the work. In addition to the special men a complete set of tools and parts should be kept where they are readily available for emergency use between the periodic repairs.

Following the observation of actual operation of the regulator the first routine in both repair and inspection is to disconnect the regulator from service. The inlet shut off valve should be the first one turned off followed by the outlet valve after which the inlet shut off valve may again be carefully and partially opened to check any build up in outlet pressure above the previously set lock up pressure. Should the outlet valve be shut first the build up in outlet pressure above lock up may be so rapid and to such a high pressure that damage may be done to the diaphragm or other parts of the regulator. By opening the inlet valve slowly it may be quickly shut off if the observed rise in pressure indicates any possible damage. When the static line has a remote connection to the distribution system it should be shut off last as it is desirable to make the lock up test under operating conditions.



Effect of Gum on Distribution Pressures. Lock up pressure Originally Ten Pounds.

The so-called breather hole or connection between the atmospheric side of diaphragms and the atmosphere is usually only a small orifice and should be examined on each repair or inspection to see that it has not become plugged. The small size of the orifice dampens the action of the diaphragm and assists in preventing humming, vibration, or extreme sensitivity of the regulator. A small clearance between valve stem and diaphragm coverplate makes a breather hole unnecessary.

Particular care should be taken when changing diaphragms to provide sufficient excess diaphragm to allow the full travel of the valve without stretching the diaphragm. Excess diaphragm greater than necessary to allow full valve travel decreases the effective area and may also result in bagging or waving between flanges making a gas tight

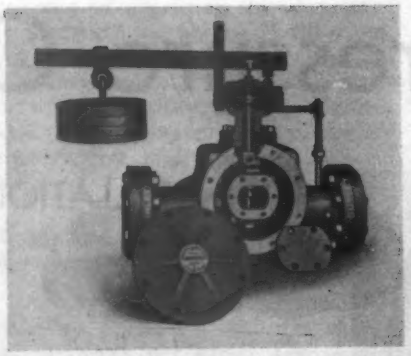
Rubber Diaphragms Are Much Smoother and More Easily Formed Than Leather.

joint practically impossible. Securing the proper amount without several attempts requires considerable experience on the part of a repairman. Diaphragms will frequently tear shortly after being changed due to insufficient excess which the repairman should have observed on his final inspection if not during the actual installation.

Fitting Main Diaphragm

The main diaphragm of practically all line regulators must be fitted before the cover plate is placed in position. With the cover plate removed the valve stem may be off center resulting in an apparent sufficiency but an actual lack of excess diaphragm. With the cover plate in place and acting as a guide for the valve stem a diaphragm previously fitted with the valve stem off center may not have sufficient excess on one side resulting in stretching when the valve approaches the full open or shut positions while stretching may be the cause of tearing.

Another cause of insufficient diaphragm excess is caused by repairmen attempting to eliminate any waves or creases in the diaphragm between flanges by pulling toward the outside after placing the cover plate in position but before tightening the bolts. Such a practice may leave in-



Wide Flanges in All Locations Prevent Leakage and Facilitate Installation. Note Comparatively Small Diameter of Diaphragm Which Requires Care to Secure Proper and Even Excess

sufficient excess of diaphragm in one or more locations. Shellacking the diaphragm to the bottom flange assists in maintaining a smooth surface during the placing of the cover plate.

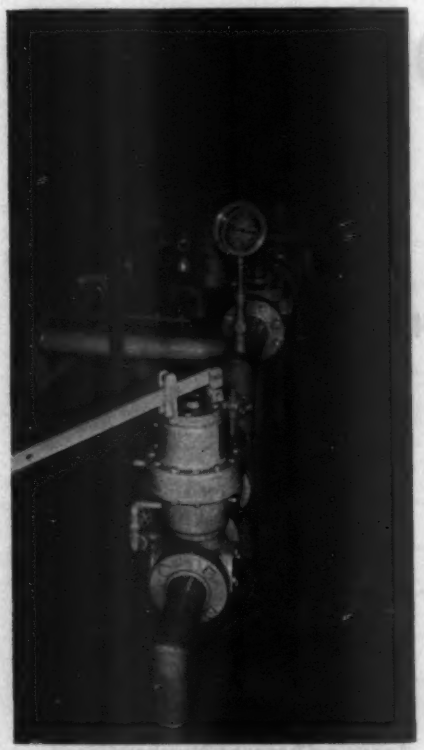
Cutting of the diaphragm at the edges of diaphragm plates or flanges is a common source of trouble during operation. Such a defect is difficult to forecast by means of any test and is therefore a matter of observation and skill on the part of the workman. The diaphragm when removed should be carefully examined by the repairman to detect any evidence of a cutting action on the diaphragm, the reason determined and eliminated before installing a new diaphragm. Before removing any diaphragm it should be marked so that its position relative to the flanges may be easily determined to facilitate locating the causes of injuries or difficulties noted from a minute inspection after removal. Some regulators provide a natural distinguishing mark of diaphragm position but unless all regulators on a system have such marks the repairman should acquire the habit of marking all types. Whenever removed diaphragm plates and flange faces should be carefully felt with the hands just before replacing to determine whether there are any sharp projections or any material has adhered to them which might puncture, wear or cut the diaphragm. This precaution should be taken not only after a diaphragm has been torn but where a porous diaphragm has caused a continuous leakage of gas as the diaphragm may not have been naturally porous.

When the flanges holding a diaphragm are narrow the flange gripping power is sometimes insufficient to prevent the diaphragm from being gradually pulled into the interior of the regulator unless especial care is taken in tightening the flange bolts. A worthwhile precaution is to have the diaphragms at least a half inch larger in diameter than the outer diameter of the flanges as the projecting part of the diaphragm will often curl a slight amount adding considerably to the power required to pull the diaphragm into the interior of the regulators.

Even though the flanges may have considerable extra width all bolt holes should be punched with template guides instead of cutting slits or vees from the outer edge of the diaphragm into the bolt location. This precaution not only minimizes the chances of the diaphragm being pulled but accurate punching of the holes assists in preventing wrinkles occurring between the flanges thus adding to leakage prevention. A template used as a guide also assures the proper amount of excess diaphragm.

A few regulators have been built with the diaphragm designed to be entirely inside of the flange bolt circle. The disadvantage of such a design is that during the placing of the diaphragm cover plate the diaphragm itself may slip toward the center leaving only a slight width for gripping or may be easily wrinkled. Difficulties arising from these conditions may not be immediately evident but occur after the regulator has been put in service and thus add to expense by unnecessarily requiring the repairman to return.

Wide Flanges on Diaphragm Bowl and Check Valve Assist in Preventing Leakage.



Two Diaphragms Separated By an Annular Ring Are Installed in This Regulator and the Chamber Between Vented to the Atmosphere. Should the Bottom Diaphragm Fail the Escaping Gas Does Not Fill the Structure and the Restricted Vent Size Allows a Poorer Quality But Continued Functioning of the Regulator.

Before installing a diaphragm the flange surfaces should be thoroughly cleaned of any adhering material, metallic projections or oil. The tendency in modern practice is to increase the use of rubber or other molded compounds having properties similar to rubber and to eliminate leather. When using substitutes for leather diaphragms the diameter should be sufficient to be flush with or extend beyond the flange edge as the material is usually of a nature which will provide an initally leak proof joint without sufficient compression between the flanges to keep the diaphragm permanently in place. Practically all leather substitutes are easily blocked and are more accurately centered and maintained in the proper position when bolt holes are punched with a template as a guide. Shellacking these types to the flanges has no particular advantage as they are molded to lay flat on the flange surfaces and with ordinary care in tightening the flange bolts will not move out of place during operation.

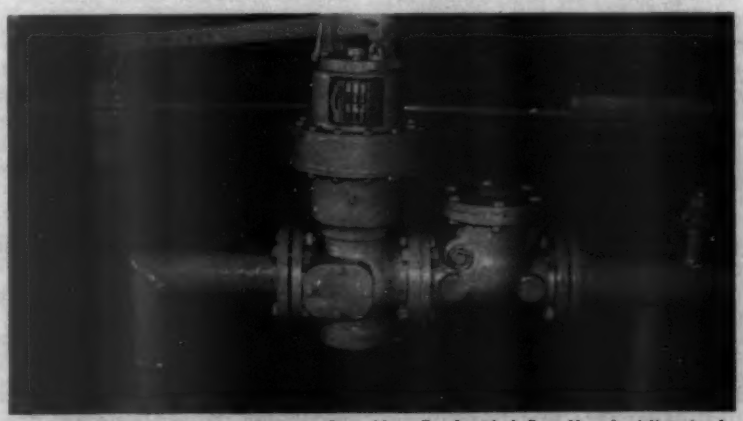
To secure sensitivity pliable diaphragms are often used but difficulty is experienced in securing pliable diaphragms with sufficient strength to withstand the pressures to which they will be subjected. Extremely pliable diaphragms also facilitate installation but the ease with which they may be torn and the resulting increase in distribution pressure may interfere with the proper operation of a whole system. For instance the failure of a diaphragm on a system where sixty pounds was carried on the transmission line caused the transmission pressure to temporarily drop to the regulated pressure of thirty pounds and the pressure on the transmission line could not be built up until the sub-transmission line with the various distributing mains attached and a high pressure holder had been filled to the pressure of sixty pounds by which time difficulties had been experienced in maintaining service on other distribution systems taking off of the transmission line. In this particular instance by substituting diaphragms which would withstand pressures of 125 pounds in place of 40 used initially there was an acceptable decrease of approximately one half pound in the sensitivity of the regulator but the tearing of diaphragms between periodic changes was entirely eliminated.

Uniform tightening of flange bolts not only in connection with the diaphragm flanges but in all instances depends upon the convenience with which the wrench may be attached to the bolt or nut and the space available for turning. Providing hexagonal nuts or bolts will materially assist in securing uniform compression of the flange as the space required for turning or gripping is less than where square headed bolts or nuts are used. The threads on the bolts and nuts should be lubricated to increase the ease with which they may be removed. Lubrication with a rust inhibiting type of grease is preferable to the usual types of joint compounds as hardening of any material used adds to the difficulty of starting the removal of the nut. Certain joint compounds are nondrying and are, therefore, valuable in this type of work. As in many other instances the joint compound should in no way be relied upon to produce a tight gas joint. If leakage is experienced around the bolt the difficulty is usually a crack in or fold of the diaphragm or gasket and the cause should be eliminated rather than the use of excessive quantities of thread compounds or installation of grummets on both ends of the bolt. Instances have been known where no apparent cause in the gasket or diaphragm could be found for continued leakage around the bolt until the casting itself was closely examined and found to be porous with openings extending from the bolt hole to some point inside of the diaphragm bowl.

Stud bolts are frequently used on line regulator flanges, the idea being to minimize potential sources of leakage. This advantage has value but the frequency of stud bolt breakage especially in smaller sizes offsets the advantage as removal of the broken section often requires drilling and retapping.

The amount of weights on the lever arm has often been given as the reason for the tearing of diaphragms. This would appear to be a logical reason, as that which is obvious to the eye often leaves the most impression. However, the majority of regulators in the lower ranges of pressure which would be four to six pounds outlet are designed to require between thirty and forty pounds of weights at practically the end of the lever arm. Such regulators may be loaded up to seventy pounds of weights on the lever arm without ordinarily injuring the diaphragms. For special purposes line regulators have been designed to carry 140 pounds on the lever arm and the

(Continued on page 48)



Stud Bolts in Some Flanges Can Not Be Avoided But Use Is Minimized.

Establishing An Operating Schedule

A Practical Plan for Control of Meter Reading, Billing, and Collections

By

Henry J. Johnson

Manager, Public Utility Sales Division
Remington Rand Inc.
Buffalo, N. Y.

NO organization can function smoothly unless the operating schedule is such that all activities are handled on a perfectly uniform basis and in proper continuity. Peaks and valleys must be eliminated. A specific time must be established for the performance of every duty. This makes it possible to fix definite responsibility for every activity. Rush periods will be eliminated and all operations will be completed on time.

A great deal of experimenting has been done in connection with the division of accounts into districts, routes and ledgers for meter reading, billing, ledger control, discount date and collection activity purposes. The plan must, in addition to creating a uniform division of accounts, also provide a practical method of assigning district, route and account numbers. This should be done on a basis that will not only make it as permanent as possible but also make it possible to keep all meter reading books uniform in size whenever unusual building activity causes some books to become too large. This rearrangement of meter reading routes should not necessitate the renumbering of accounts due to the fact that this would involve changes on the addressing plates, meter sheets, service location record, alphabetic index, deposit ledger and possibly other files which may be in use. The necessity of making these changes would not only involve a large clerical expense, errors, confusion during the operation but would also seriously handicap subsequent reference work involving the tracing of an account from the current to the previous arrangement. An operating schedule is illustrated which is based on a division of accounts into twenty-one districts. It has been found from practical experience that twenty-one districts is the maximum number that can be handled satisfactorily, allowing for unavoidable interruptions and delays caused by bad weather, sickness, etc. This arrangement involves four weeks of five days each and one additional day at the end of the month. Each district represents one day's reading and billing and all subsequent and related operations and activities. Each district is divided into as many meter reading routes as may be necessary. This division permits the billing of all meters in the same month in which they were read, which is desirable from the standpoint of preparing monthly revenue reports and comparing the revenue of each month with the same month of the previous year.

Uniform Discount Dates

This schedule provides for continuous discount dates and the date for each district is uniform each month. This makes it possible for the customers to remember their discount date and eliminates a large number of complaints now being received from customers who insist that that is the reason they failed to pay their account within the discount period. It will be noted that the discount date for each district is the same as the number of the district. This makes it possible to determine the discount date of any customer by merely knowing the account number.

Whenever a discount date occurs on Sunday the accounts are due the following business day in accordance with standard commercial practice as regards due dates in connection with notes and other commercial documents. Whenever this does occur the schedule automatically adjusts itself due to the fact that there are two blank dates following each five.

Assigning Account Numbers

It has been rather common practice to use a separate series of account numbers for each route. This has made it necessary to sort the cash stubs by routes and then into account number order, which has resulted in a very complex sorting problem, particularly in a large company. In addition to this whenever it has become necessary to shift certain accounts from one meter reading route to another in order to equalize the size of the books it has involved the changing of the account numbers on these accounts on all the books, files and records.

In order to correct these difficulties only one series of numbers is used for each district. The numbers are assigned in route order. The routes are designated by numbers but these numbers do not appear on any of the records. They are merely used for the purpose of filing the books in proper order. The first account number in each district is assigned to the first sheet in book number one. The first sheet in book number two is given a number immediately following the last sheet in book number one. This is continued until all of the accounts in each district have been numbered.

Only every fifth number should be used in order to allow for adequate expansion and growth. In new sub divisions one number should be allowed for each vacant lot in order to avoid the necessity of renumbering or using sub numbers.

OPERATING SCHEDULE

DISTRICT NUMBER	DATES TO						
	READ METERS	READ SKIPPED METERS	BALANCE LEDGERS	BILL	DISCOUNT	ENTER FORFEITED DISCOUNT	SEND DELINQUENT NOTICES
1	16	17	17	18	1	4	6
2	17	18	18	19	2	5	7
3	18	19	19	20	3	6	8
4	19	20	20	21	4	7	9
5	20	21	21	22	5	8	10
8	23	24	24	25	8	11	13
9	24	25	25	26	9	12	14
10	25	26	26	27	10	13	15
11	26	27	27	28	11	14	16
12	27	28	28	29	12	15	17
15	1	2	2	3	15	18	20
16	2	3	3	4	16	19	21
17	3	4	4	5	17	20	22
18	4	5	5	6	18	21	23
19	5	6	6	7	19	22	24
22	8	9	9	10	22	25	27
23	9	10	10	11	23	26	28
24	10	11	11	12	24	27	29
25	11	12	12	13	25	28	1
26	12	13	13	14	26	29	2
27	13	14	14	15	27	1	3

Sorting Cash Stubs

Each cashier should be provided with a rack containing twenty-one compartments in order to permit the segregation of the stubs by districts during the day as they come in. At the end of the day it is only necessary to combine the stubs from the various cashiers for each district and then merely arrange each group in strict numeric order. This makes it possible to have the stubs ready for cash posting much sooner than under any other arrangement. It also saves a very substantial amount of clerical time and expense. There is much less possibility of incorrect sorting than when it is necessary to sort into a large number of routes.

Equalizing Meter Reading Routes

Whenever any meter reading route becomes too large or whenever it becomes desirable to add another route to each district it is only necessary to move the desired number of sheets from the back of one book into the beginning of the following book and continue this until all of the books have been made equal in size or until a new book has been created. In some instances the above procedure is reversed. This is accomplished without having made it necessary to change any account numbers.

Arrangement of Addressing Plates

The following arrangement of the name, address and account number on the addressing plates is recommended:

John R. Citizen 15
126 Market St 1865
Anytown, U. S. A.

The upper number represents the district and the lower one the folio.

Collection Activity

The operating schedule has been devised so as to permit the completion of all collection effort several days prior to the reading of the meters the following month. This has a beneficial effect on collections because the customer was contacted far enough in advance of the due date of the bill for the following month so as to eliminate the feeling that the obligation has been discharged for another month. If the customer is not contacted until after the new bill has been received the collector may be successful in collecting the arrears amount but the same process will have to be repeated the following month. This schedule is in actual operation by both large and small companies and has been found entirely practical. Additional description of the operating procedure will be covered in a subsequent issue.

Bad debt losses are also reduced by the fact that a closer follow up on collections is secured.

Gas Utility Revenues Gain in First Six Months

Domestic customers served by manufactured and natural gas utilities totalled 14,929,000 on June 30, an increase of 91,000 during the first six months' interval, according to Paul Ryan, A.G.A. Chief Statistician.

This gain in customers is reflected in the fact that a total of 482,500 gas ranges were sold in the country during the first half of 1935. This was an increase of nearly 27 per cent over the first six months of 1934. Approximately 80 per cent of such sales consisted of relatively high priced ranges incorporating modern automatic features.

Revenues of manufactured and natural gas utilities aggregated $385,795,800 for the first six months of 1935. This was an increase of 2.7 per cent over the corresponding period of 1934. Revenues from industrial and commercial users increased nearly 7 per cent. Revenues from domestic customers however gained only 1.3 per cent.

Manufactured gas industry revenues totalled $196,276,300 for the first six months, a loss of 1.1 per cent. Revenues from industrial and commercial uses of manufactured gas gained 1.5 per cent. Revenues from domestic uses were 3.8 per cent less than for the corresponding period of 1934.

Revenues of the natural gas industry for the first six months amounted to $189,519,500, a gain of 7.0 per cent over a year ago. Revenues from industrial uses increased 10.1 per cent, while revenues from domestic uses gained 5.5 per cent.

Gas Analysis: The Application Of Exact Analysis To Industrial Problems - Part III

By

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Indiana Consumers Gas & By-Products Company, Terre Haute, Indiana

Modified Method for Computing the Analysis

IN order to reduce the time involved by the computations given above, tables of factors were prepared which automatically correct for the items previously enumerated and at the same time preserve the accuracy obtained by the more lengthy calculations.

The table of these factors was obtained in the following manner. A representative analysis of the type gas was selected and the factors computed on the basis that within allowable limits the corrections would not be in error to a greater extent than the limit of accuracy of the analysis itself.

The calculations given are for the sample of "send out" gas used in the foregoing section, but of course can be adapted for any type of gas. The final analysis of this gas was:

	%		
CO_2 —	0.95		0.95
O_2 —	0.10	The sum of	0.10
Ill. —	0.90	absorbed	0.90
H_2 —	39.38	constituents	
CH_4 —	37.87	is	1.95
CO —	15.88		39.38
N_2 —	4.91	The sum of	37.87
		combustible	15.88
Total —	99.99	components	
		is	93.13

and the factors are computed between the allowable limits of the sample size 75 ML to 85 ML which is the permissible capacity when considering the O_2 required for combustion.

Assuming the size sample to have been 75 ML, then the volume of the absorbed constituents would be 1.95 × 0.75 — 1.46 ML and the volume of the remainder would be 75.00 — 1.46 — 73.54 ML. The unburned gas then remaining in the manifold is:

$$0.877 \times \frac{1.436}{1.436 + 73.54} = 0.0168 \text{ ML}$$

(N_2) and 0.877 — 0.017 = 0.860 ML Unburned Gas. The volume of gas actually burned is 73.54 — 0.86 = 72.68 ML and the fraction of the original sample used for computing the combustible components is

$$\frac{73.54}{72.68} = \frac{75.00}{x}$$

or calculating the reciprocal direct

$$x = f_2 = \frac{73.54}{75 \times 72.68} = 1.3491$$

to be used for computing H_2, CH_4 and CO, and $f_1 = \frac{1}{75} = 1.3333$ for computing CO_2, O_2, Ill. and N_2. In arranging the table, the factor $f_2 - f_1$ is used, for f_1 is obtained first from a table of reciprocals, and the factor $f_2 - f_1$ can then be added to f_1 to obtain f_2. In this instance, $f_2 - f_1$ — 1.3491 — 1.333 — 0.0158.

The N_2 correction is obtained in much the same manner. Taking the sum of the combustible components and reducing to a 75ML sample 93.13 × 0.75 = 69.85 ML which of course would be high by the amount left in the apparatus.

It is necessary at this point to assume a quantity for this amount left in the apparatus, but this assumption introduces no error in the result as will be shown.

From the sample calculation previously given, it was learned that with an original volume of 81.88 ML there remained in the apparatus 0.82 ML of H_2, CH_4, and CO and deducting this quantity from 69.85 — 0.82 = 69.03 ML of H_2, CH_4, and CO actually burned, and the correction becomes

$$\frac{69.03}{72.68} \times 0.860 = 0.817 \text{ ML or } 0.82 \text{ ML.}$$

In order to check for any error introduced in the above calculations by the assumption of 0.82 ML as the volume of H_2, CH_4 and CO remaining in the apparatus, the last equation can be employed between the resultant limits of 0.814 or 0.81 ML and 0.826 or 0.83 ML which would give a significant error of ± .01 ML.

$$\frac{x}{72.68} \times 0.860 = 0.814 \text{ or } x = 68.81$$

ML and the volume remaining in the apparatus would then have been 69.85 — 68.81 = 1.04 ML which is greater than the actual volume of 0.877. In the same manner for the upper limit $\frac{x}{72.68} \times 0.860 = 0.826$. $x =$ 69.82 and 69.85 — 69.82 = *0.03* ML which would be too low by an unreasonable amount.

The factors for the remaining volumes 76 to 84 can be calculated in the manner described above, and the completed table arranged in this fashion:

CORRECTION FACTORS

Tank Oxygen Correction		Reduction Factors		
			CO_2, O_2, Ill. Pipettes	
O_2 Taken into Burette ML	Inert Content ML	Volume Original Sample ML	$f_2 - f_1$	N_2 Correction
80	0.42	75	0.0158	0.82
81	.43	76	.0154	.82
82	.43	77	.0150	.82
83	.44	78	.0146	.82
84	.45	79	.0143	.82
85	.45	80	.0139	.82
86	.46	81	.0135	.82
87	.46	82	.0132	.82
88	.47	83	.0129	.82
89	.47	84	.0126	.82
90	.48	..	....	..

To use the table of reduction factors with an original gas sample of 81.88 ML, f_1 (for CO_2, O_2, Ill. and N_2) as mentioned previously is obtained from a table of reciprocals $\frac{1}{81.88} = 1.2213$ and $f_2 - f_1$ is found by interpolation between the factors for 82 and 82 ML sample to be 0.0132. f_2 then becomes $1.2213 + 0.0132 = 1.2345$ and the N_2 correction is found to be 0.82 ML.

The derivation of the table itself becomes relatively simple for as the individual factors are computed an arithmetical difference is readily noted which makes it possible to avoid many computations.

In calculating the heating value of the gas from the analysis Rossini's (Bureau of Standards) values are used which are, on the gross saturated 60-30 basis,

$H_2 = 319.41$
$CO = 316.13$
$CH_4 = 997.2$
$C_2H_6 = 1748$

Before these values were used, it was quite difficult to obtain any satisfactory checks between the determined and the calculated heating values.

The choice of which values to use for the individual specific gravities is left with the analyst, for the variance is not as gross in this instance as in those reported for the heating values. Care must be taken, however, in the comparison of the determined and the calculated specific gravities to reduce both to the same temperature and to correct for the water vapor if desired on the saturated basis.

Application

The apparatus and the technique employed which have been described in the previous sections of this paper have proven of considerable value in maintaining a close supervision over the characteristics of the gases manufactured both in direct checking of the supervising instruments such as the Junkers and Thomas calorimeter and Ac-Me Specific Gravity Recorder, as well as the supervision of the reforming operation itself where the size of the sample is necessarily limited.

In checking the instruments a two hour sample is drawn into the sample holder and as described in Section I, the Junkers test is conducted on this sample, collecting at the same time the sample for analysis.

A small pump is used to supply the gas to the Thomas Calorimeter, the Calorimixer and the Ac-Me Recording Gravitometer, and this pump is also the source for the sample drawn into the sample holder. This arrangement permits a direct check on the Junkers, and Thomas Calorimeter and the Gravitometer from the one gas analysis.

The upper limit of the specific gravity of the gas has been an essential feature of the operation, for the territory served had been operating on a gas of 0.400 to 0.420 specific gravity and the calculated allowable upper limit was 0.490. The present operation in reforming maintains the specific gravity at about 0.470 for the finished gas.

To assist in determining the factors of operation which tended toward the production of a high gravity gas from the generator, a series of analyses was conducted of the gas made during different parts of the cycle, two of which series are given here.

Without discussing the full value of these analyses, it is of sufficient interest to note the close agreement of the samples which were taken on two successive days with no appreciable change in operation, and the value of such analyses where it is impracticable to attempt the collection of large samples, due to the extremely short period of time. For example, the time of the cycle for the first up-run was only twenty-six seconds.

At different times during the work check analyses were conducted to determine the accuracy which could be expected from the method outlined, two of which checks are given here. The natural gas was that used in the systematic study for the illuminants extraction, and the sample of "reformed" gas was used to check the accuracy of sampling over mercury instead of acidulated water.

Conclusion

The determination of an "exact" gas analysis is not an especially simple one, but it is hoped that the facts presented in this paper are of sufficient value to suggest a more extended application of this type of analysis to plant operation.

In conclusion the author desires to express his appreciation particularly to D. O. Douglas of the plant laboratory for his painstaking care in the performance of the analyses, many of which were quite arduous, and to Martin Shepherd of the Bureau of Standards for his kindly suggestions at different points along the way.

	First Up-Run		Down Run		Second Up-Run	
	3-22-33	3-23-33	3-22-33	3-23-33	3-22-33	3-23-33
CO_2	0.81	0.62	0.93	0.89	1.38	1.25
O_2	0.12	0.06	0.16	0.04	0.03	0.03
Ill.	0.30	0.36	1.12	1.41	0.69	0.60
H_2	61.96	62.17	64.67	64.75	52.92	55.55
CH_4	1.74	1.47	9.04	8.59	13.83	12.09
CO	31.24	31.29	21.58	21.16	28.78	28.11
N_2	3.83	4.03	2.50	3.16	2.37	2.37
Total	100.00	100.00	100.00	100.00	100.00	100.00
B.t.u. calculated ..	319	318	385	387	411	398
Sp. Gr. calculated ..	0.409	0.406	0.356	0.358	0.444	0.426

CHECK ANALYSIS

Natural Gas Sampled in Steel Tank 120 lb. (2-28-34)				Reformed Gas Sampled Over Mercury (10-12-33)		
	Analyzed				Analyzed	
	2-28-34	3-5-34	8-23-34		10-12-33	10-13-33
CO_2	0.05	0.05	0.07	CO_2	1.32	1.31
O_2	0.07	0.05	0.00	O_2	0.19	0.10
CH_4	92.25	92.59	92.42	Ill.	1.01	0.95
C_2H_6	2.62	2.48	2.57	H_2	56.43	56.60
N_2	5.01	4.83	4.94	CH_4	12.77	12.81
				CO	25.07	25.03
Total	100.00	100.00	100.00	N_2	3.22	3.20
B.t.u. Junkers ...	970	970	970	Total	100.00	100.00
B.t.u. calculated ..	966	967	967	B.t.u. Junkers	400	400
Sp. Gr. Edwards Balance ...	0.595	0.595	0.595	B.t.u. calculated ..	405	405
Sp. Gr. calculated ..	0.589	0.587	0.588	Sp. Gr. calculated ..	0.4190	0.4167

Rental Plan for House Heating

Goal Set for 5,000 New Customers

By C. D. GREASON

Director, Publicity and Advertising,
The Gas Service Company, Kansas City, Missouri

MORE than 5,000 additional customers in the properties of the Gas Service Company, Kansas City, Mo., are expected to be heating their homes with natural gas during the coming winter, the result of a rental plan on heating equipment inaugurated by the company August 1. This is the goal which has been set by this company's New Business Department and judging from the fine start already obtained in the campaign this figure will be exceeded.

The rental plan for heating equipment was decided on by this organization after the company's sales departments made an outstanding showing in the plan of renting automatic storage water heaters, put into effect for the first time on March 1 of this year.* At the time this rental plan was started it was believed it would be possible to add approximately four times more water heaters to the company's gas lines this year than in 1934. A quota of 5,600 water heaters was set to be sold and rented from March 1 to December 31. On August 17, salesmen had rented and sold 5,063 automatic heaters. Approximately 80 per cent of this number have been added to the gas lines by the rental plan which means that the salesmen this year are selling approximately the same number of heaters as last year and that orders taken under the rental plan are accounting for entirely new water heater business which would not otherwise be obtained.

The rental plan on house heating equipment is one of the most ambitious ever attempted by the sales departments of the Gas Service Company. It will give the organization an opportunity of reaching an entirely new group of customers, those who are renting. Many renters will not make an investment in heating equipment where it is necessary to spend considerable money at one time. They will, however, take advantage of the opportunity of renting equipment and making a small payment each month. Because of the economic situation many owners of rental property are not in a position to spend money for heating equipment and improving the property. As a general rule the owner is only taking care of necessary maintenance.

Appliances Featured

The Gas Service Company properties rental plan includes conversion burners, space heaters and unit heaters. Gas designed furnaces are not included.

With the conversion burner to be installed under the rental plan will be a new style thermostat, V-15-5 motor valve, ring burner, leading radiants, secondary air control and lava tip pilot. The burners are being rented to customers at a monthly charge of $2.75. This price includes all domestic sizes of burners.

Five various sizes and models of space heaters are being rented. Two of last year's models are being rented for $1.30 and $1.60 per month, three new models known as size 42-C are renting for $1.50 monthly, size 60-C for $1.80 and No. 80-C for $2.40.

While the company has a plan for renting unit heaters, prices that will be made include delivery to the customer but do not include installation cost. However, this company is making it possible for unit heater customers to pay for the installation cost under regular sales contracts on a time payment basis not to exceed three months.

One of the most important features of the entire rental program and the one that is meeting with favor with customers is the fact that it is not necessary to pay rental charges during the summer months when the appliances are not being used. No down payment is required. It will be possible for the customer to purchase the appliances at any time during the period of the rental contract, a discount of 20 per cent being allowed from the balancce due after deducting the rental payments previously made.

The househeating rental plan was first introduced to company sales managers and supervisors at a meeting held in Kansas City July 31. The meeting was under the direction of F. M. Rosenkrans, New

Window Display Announcing New House Heating Rental Plan.

* *Described in July, 1935, Issue American Gas Journal.*

Business Manager of the Gas Service Company.

Newspapers are being used as the principal medium for acquainting customers with the new plan.

In Kansas City, Mo., the Kansas City Gas Company, largest of the Gas Service properties, will use a two-month billboard showing, using approximately sixty selected poster boards. This showing appearing for the first time about September 1. A few of the other large company properties will also do some billboard advertising.

Many of the Gas Service Company properties have used a mailing piece to introduce the new plan to customers. Some properties used letters, inviting customers to inquire about renting heating equipment. Others used small printed circulars.

H. C. Porter, New Business Manager of the Kansas City Gas Company, had 40,000 reprints of a full page ad used in the Kansas City Journal-Post mailed to that number of domestic customers not heating with gas. A business reply card was attached to the ad., this card addressed to the company and stating, "Please give me complete information on your rental plan for house-heating equipment. It is understood that I am under no obligation whatsoever." Many excellent leads for the salesmen are expected to result from this mailing. On the third day after most of the letters had been mailed, eighty-five cards had been returned and sixty-two telephone calls made to the company office asking that a salesman call at the home to give the customer full information on the plan.

All of the Gas Service properties are using window displays to call attention to the rental plan. Some of the companies will also use the post cards on which gas bills are mailed to further advertise the rental plan.

NOW YOU CAN...
RENT
GAS HEATING EQUIPMENT
CONVERSION BURNERS
$2.75 PER MONTH
A Gas Burner for Your Furnace Complete With Automatic Heat Control
GAS is the Ideal Heating Fuel
Every home can now enjoy the comfort and convenience of GAS HEAT...
SPACE HEATERS
MONTHLY RENTAL $3.00 to $3.40
Independent Circulator Heater For Homes Without Basement or Furnace
* NO DOWN PAYMENT
* NO INSTALLATION CHARGE
* NO OBLIGATION TO BUY
* No Rental Payments During MAY • JUNE • JULY • AUGUST
UNIT HEATERS
MONTHLY RENTAL $4.00 to $10.00
Installations Will Be Made In Order Received
KANSAS CITY GAS CO.
Phone and Our Representative Will Call
Phone and Our Representative Will Call

Full page newspaper advertisement

DETERMINATION OF THE COKING PROPERTIES OF COAL

Three different methods for determining agglutinating value are applied to nine representative coking coals. The methods are: the Kattwinkel (Gas-u.Waserfach 69, 145; 1926), the Damm (Brennstoff Chem. 9, 293; 1928) and the Marshall-Bird (Am. Inst. Mining Met. Eng. Tech. Pub. No. 216; 1929). The Marshall-Bird is the method adopted by the authors. Results for the first are given by three different laboratories. It is shown that neither method places the coals in the correct order as regards known quality of oven cokes produced and that different laboratories do not get the same results with the same method. The agglutinating value test is considered valuless, therefore, for predicting the quality of coke obtainable from a coal. A carbonization test method similar to that of the U. S. Bureau of Mines, but of much smaller capacity (1.5 kg.), is described whereby yields of carbonization products agreeing closely with those obtained in coke ovens are realized. It is shown that the comparative quality of the test coke (by tumbler test) agrees very well with that from the same coals in a coke oven. Six retort charges are required for a tumbler test, the carbonizing temperature (furnace) is 1000° and the carbonizing time three hours. The charge in the retort is so tamped that the average charge density in a coke oven is realized.

A. Jenker, F. Kühlwein and E. Hoffmann, Glückauf v. 70, 473-81 (1934).

HYDROGENATION OF LOW-TEMPERATURE TAR AND TAR PRODUCTS

Work in progress at the Fuel Research Station is described. Some details are given of the design and operation of an internally, electrically heated continuous converter working at 480° and 200 atmospheres pressure and capable of treating about one hundred pounds of crude low-temperature tar per day, and of an atmospheric pressure plant for the reduction of tar acids, e.g., cresylic acid, to hydrocarbons, having a through-put of about one gallon per hour. The latter plant comprises two vertical converters, 4 ft. long and 5 in. in diameter, heated by flue gases. The catalyst (bauxite—molybdenum trioxide) deteriorates rapidly and has to be revivified after operation for about six hours by heating at 500-550° in a current of air and steam.

F. S. Sinnatt, Gas Jour. (London), v. 208, p. 433-8 (1934).

Domestic Gas Utilization

Water Heating Division

Water Piping and Installation

By

Charles W. Merriam, Jr.

Div. Commercial Manager, Roanoke Gas Light Co.
Roanoke, Va.

EXCELLENCE in design and production by a manufacturer as well as the exercise of discrimination by the salesman as to the selection of size, heat input and thermostatic setting, can all be defeated by improper automatic water heating hook-ups and ill-considered water piping systems. In a surprising number of cases bad plumbing from the heating unit to the points of use has been the major cause, or at least a contributing factor, of customer dissatisfaction with either the monthly operating cost or the performance—perhaps both. Sound installation practice is an integral part of each and every successful job. Due to the importance of proper installation work every retail salesman should be at least conversant with the major considerations.

The gaining of a wide water heater market demands that the gas industry comprehend and accept its responsibility for the entire layout from start to finish. In the average community the customer with an automatic heater looks to the gas company for satisfactory service in all particulars, irrespective of the previous water piping or any contractor or subcontractor that might have entered into the picture at any time. Despite any theories involving dealer cooperation no matter how inviting such illusions of profit might be, the utility must take the initiative in this respect. This is particularly true in the higher price gas areas. Broader acceptance of gas-fired water heating, in fact even retention of the gas demands now being enjoyed, is inseparable from general customer satisfaction "at the faucet" despite any "buts, ifs, or what-nots" involving plumbers, dealers or other agencies. Salesmen must talk to the customer in terms of automatic hot water results at the faucet. Utilities must recognize the demands of the purchaser for singleness of responsibility in consequence of which the salesman must be armed with an all-around knowledge including Water Piping and Installation.

The enumeration below constitutes the major installation problems worthy of discussion from a sales point of view:

1. Selection of proper pipe size.
   a.) To insure satisfactory delivery of probable simultaneous hot water demands.
   b.) To prevent excess heat losses inherent in unnecessarily large piping.
2. Location of heating unit.
   a.) To permit adequate draft.
   b.) To provide the shortest possible hot water pipe runs.
3. Adoption of economy measures such as:
   a.) Separate copper tubing to kitchen sink.
   b.) Rewashering leaky faucets.
   c.) Use of snap-action, self-closing spring faucets.
   d.) Trapping lines to prevent one-pipe circulation.
   e.) High thermostatic storage temperatures.
4. Miscellaneous considerations such as location of and drainage from temperature relief valves, use of tempering tank, series hook-up with furnace coil and others.

We will wrestle with the above in the following.

The first phase to be grappled with is proper water pipe sizes. The accompanying tabulation shows water deliveries in gal. per min. at various pressure drops through different lengths of standard sized pipes. Selection of the proper pipe size should be such as to

WATER FLOW IN GALLONS PER MINUTE THROUGH VARIOUS PIPE LENGTH AND PRESSURE DROP

Nominal Size of Pipe in Inches	Pressure Drop in Lbs. Per Sq. In.	Length of Straight Pipe in Feet					
		20	30	50	70	100	150
¼" Copper	30	6.0	4.9	3.8	3.2	2.7	2.2
Tubing	40	6.9	5.7	4.4	3.7	3.1	2.5
Pipe Size	50	7.7	6.3	4.9	4.1	3.5	2.8
	75	9.5	7.7	6.0	5.1	4.2	3.5
⅜" Copper	30	11.9	9.7	7.5	6.4	5.3	4.4
Tubing/Iron ..	40	13.8	11.2	8.7	7.4	6.1	5.0
Pipe Size	50	15.4	12.6	9.7	8.2	6.9	5.6
	75	18.9	15.4	11.9	10.1	8.4	6.9
½" Brass	10	12.4	10.1	7.8	6.6	5.6	4.5
Pipe Iron	20	17.5	14.3	11.1	9.4	7.8	6.4
Pipe Size	30	21.5	17.5	13.6	11.5	9.6	7.8
	40	24.8	20.3	16.1	13.3	11.1	9.1
	50	27.7	22.6	17.5	14.8	12.4	10.1
	75	34.0	27.7	21.5	18.2	15.2	12.4
¾" Galv.	10	24.7	20.1	15.6	13.2	11.0	9.0
Pipe	20	35.0	28.5	22.1	18.6	15.6	12.8
	30	42.7	35.0	27.1	22.7	19.1	15.6
	40	49.2	40.4	31.2	26.4	22.1	17.9
	50	55.3	45.1	35.7	29.4	24.7	20.1
	75	67.6	55.3	42.8	36.2	30.2	24.7
1" Galv.	10	45.2	37.0	28.6	24.2	20.2	16.5
Pipe	20	64.0	52.2	40.5	34.2	28.6	23.4
	30	78.4	64.0	49.5	41.9	35.0	28.6
	40	90.5	73.9	57.2	48.4	40.5	33.0
	50	101.2	82.6	64.0	54.1	45.2	36.9
	75	123.9	101.1	78.4	66.2	55.4	45.2
1¼"	10	60.4	49.4	38.2	32.3	27.0	22.6
	20	85.0	70.8	54.8	45.5	38.0	31.3
	30	105.2	85.9	66.5	56.3	47.0	38.4
	40	120.8	98.8	76.4	64.7	54.0	44.1
	50	136.3	111.5	86.2	73 9	60.9	49.7
	75	167.0	136.5	105.6	89.4	74.6	60.9
2"	10	197.0	161.1	124.5	105.4	88.0	71.9
	20	279.8	228.7	176.8	149.7	125.0	102.2
	30	342.3	280.0	216.4	183.3	153.0	125.0
	40	393.7	312.0	249.0	210.9	176.0	143.8
	50	441.1	360.9	279.1	236.2	197.3	161.2
	75	541.0	442.3	342.2	289.5	241.8	197.5

deliver and provide adequate pressure at the faucet (say 5 lb.) for the volume of water desired (say a bathtub H-faucet with a 6 gal. flow per min.), with a minimum water pressure available at the outlet of the storage tank (say 55 lb.) which is located, say, 35 ft. horizontally from the bathtub faucet. Taking the above conditions, let's work out an example and lend the same practicability by assuming that the tub in question is also situated 14 ft. vertically above the tank. Since a water column 2.309 ft. in height exerts a pressure of 1 lb. per sq. in. and since we are reckoning with a 14 ft. lift, then $14 \div 2.309 = 6.1$ lb. must be lost due to the static head caused by height of the tub above the tank. Then, since 5 lb. must be available at the fixture, $55 - (5 \div 6.1) = 43.9$ lb., which is the maximum possible pressure that is available for the 6 gal. flow to lose in the $35 \div 14 = 49$ total ft. from the tank to the bathtub. Referring to the accompanying tabulation, we find that at 50 lb. drop in 50 ft. length of pipe that ¼" copper tube will deliver 4.9 gal., ⅜" copper tubing 9.7 gal., and ½" pipe (essentially the same pressure drop for either brass or iron) 17.5 gal. Since we desire to deliver only 6 gal., the ⅜" copper in this case will suffice. If a wash basin requiring 4 gal. per min. additional hot water were located alongside of the bath, the total water simultaneously deliverable would be $6 \div 4 = 10$ gal. which, under the foregoing conditions, would require a ½" pipe.* These conditions were selected at random as being average but your familiarity with this general design method and with the water pressures available in your territory will be beneficial. With a bit of practice you can figure with the "best of them."

In order to fully arm yourself, consideration ought to be given to the pressure effect of pipe fittings which, obviously, offer more resistance to the flow of water than that of the same length of straight pipe. The following table, therefore, is presented to show the factor which, if multiplied by the nominal diameter in inches of the fitting in question, will result in the approximate equivalent length of straight pipe expressed in feet:

	Factor
90 deg. elbow	2
90 deg. elbow—long sweep	1
45 deg. elbow	1
Tee	2
Reducer	2-4
Gate Valve	1
Globe Valve	2

For instance, suppose that in the case cited above there was included in the 49 ft. of ½" (0.5) pipe, a 1-globe valve, 2-tees and 3-90 deg. elbows, then $2 \times .5 + 2 \times .5 + 3 \times 2 \times .5 = 1 + 2 + 3 = 6$ ft., or the added equivalent length of pipe due to these fittings, thus making the total effective pipe length $49 + 6 = 55$ ft. Inspection of the accompanying pipe flow capacity tabulation will indicate that at the rate of 10 gal. delivery per min. the ½" size will still be adequate at the new effective length.

** Many plumbers have a common though careless rule-of-thumb dictating that for the flow involved the pipe size shall be such that the pressure drop per sq. in. will be not greater than at the rate of 10 lb. per 100 ft. of the size selected. This widely accepted trade practice is at the bottom of many of the wasteful installations of hot water heaters throughout the country. In the case discussed this 10 gal. per min. flow would under this generous sizing require a ¼" pipe which is obviously larger than necessary. In cold water lines such a rule-of-thumb works no hardship except a slight added cost of pipe material and fittings but with hot water installations in which heat loss is a decided factor in operating costs, more exact calculations of proper pipe sizes on each job is highly desirable if not imperative.*

There is a pronounced tendency in the industry towards the allowing of ridiculously large factors of safety in the matter of hot water pipe sizes which practice in gas and cold water piping does not cause detrimental results. When employing iron pipe it is considered good practice, on smaller sizes in particular, to provide a 25% to 50% margin of carrying capacity to allow for possible roughening of the interior surface caused by pitting and also for strictures in diameter due to accumulation of rust, dirt or scale.* Although the majority of installations are made with ½" pipe this is commonly accepted as the minimum size in galvanized iron. In the lay-out of a hot water piping system the minimum pressure must be taken that exists at the outlet of the heater which may be as much as 10 lb. less than that existing in the street water main. If low hydraulic pressures are encountered it is advisable when circumstances permit, to oversize the cold water piping leading to the heater to reduce pressure losses thus enabling the installation of small hot water piping. Iron water piping of 1" and smaller should always be reamed to remove inner rim caused by cutting and by compression when drawn into the joining coupling or fitting, thus leaving a continuously smooth inner surface.

The rate loss from a bare hot water pipe depends substantially upon four basic elements, namely:

1. Size of pipe.
2. Length of pipe.
3. Average internal temperature.
4. Average external temperature.

These four factors become more obvious when study is directed to the accompanying tabulation entitled "Data on Pipe Diameters and Weights, Water Pipe Storage Capacities, Heat Loss and Equivalent Gas Consumption", ** to which your energies might profitably be devoted for a few moments.

To illustrate the utility of this information your attention is directed to columns 7 and 8 in which the hourly heat loss in Btu. is shown for pipe sizes ¼" to 2", inclusive, both bare and insulated, at a 130° F. water temperature and a 70° surrounding air or atmospheric temperature. Thus, then, the difference between the water and air temperatures is $130 - 70 = 60°$ F. Provided this difference is anything other than 60° F. as shown, the actual heat loss will vary roughly in direct proportion thereto. In actual practice when the hot water faucet is closed the connecting pipe is filled with water at substantially the temperature of the water at the top of the storage tank. The pipe and the hot water enclosed therein immediately will begin to lose its heat content until the atmospheric temperature is reached, unless the faucet is turned on again before this final temperature level is arrived at. In an actual installation the average temperature of the hot water pipe will be found to approach more nearly that of the atmosphere than that of the heater thermostat setting. Columns 7 and 8 are only a statement of the temperature conditions shown, i. e., 60° F. difference. Suppose in a case example the actual difference during an entire month averaged, say, only 15° F. the calculation then for a 1" bare pipe would be: $\frac{15}{60} \times 64.8 = 16.4$ Btu. per hr., or

** A theoretical study can be pursued in "Hydraulics" by King and Wisler, published by John Wiley & Sons.*

*** Material based upon data and formulae contained in Mark's Mechanical Engineer's Handbook, Kent's Mechanical Engineers' Handbook and also "Heat Emission from Iron and Copper Pipe" by F. C. Houghten and Carl Gutberlet in the Jan., 1932, issue of "Heating, Piping and Air Conditioning."*

Domestic Gas Utilization

Water Heating Division

Water Piping and Installation

By

Charles W. Merriam, Jr.

Div. Commercial Manager, Roanoke Gas Light Co.
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EXCELLENCE in design and production by a manufacturer as well as the exercise of discrimination by the salesman as to the selection of size, heat input and thermostatic setting, can all be defeated by improper automatic water heating hook-ups and ill-considered water piping systems. In a surprising number of cases bad plumbing from the heating unit to the points of use has been the major cause, or at least a contributing factor, of customer dissatisfaction with either the monthly operating cost or the performance—perhaps both. Sound installation practice is an integral part of each and every successful job. Due to the importance of proper installation work every retail salesman should be at least conversant with the major considerations.

The gaining of a wide water heater market demands that the gas industry comprehend and accept its responsibility for the entire layout from start to finish. In the average community the customer with an automatic heater looks to the gas company for satisfactory service in all particulars, irrespective of the previous water piping or any contractor or subcontractor that might have entered into the picture at any time. Despite any theories involving dealer cooperation no matter how inviting such illusions of profit might be, the utility must take the initiative in this respect. This is particularly true in the higher price gas areas. Broader acceptance of gas-fired water heating, in fact even retention of the gas demands now being enjoyed, is inseparable from general customer satisfaction "at the faucet" despite any "buts, ifs, or what-nots" involving plumbers, dealers or other agencies. Salesmen must talk to the customer in terms of automatic hot water results at the faucet. Utilities must recognize the demands of the purchaser for singleness of responsibility in consequence of which the salesman must be armed with an all-around knowledge including Water Piping and Installation.

The enumeration below constitutes the major installation problems worthy of discussion from a sales point of view:

1. Selection of proper pipe size.
   a.) To insure satisfactory delivery of probable simultaneous hot water demands.
   b.) To prevent excess heat losses inherent in unnecessarily large piping.
2. Location of heating unit.
   a.) To permit adequate draft.
   b.) To provide the shortest possible hot water pipe runs.
3. Adoption of economy measures such as:
   a.) Separate copper tubing to kitchen sink.
   b.) Rewashering leaky faucets.
   c.) Use of snap-action, self-closing spring faucets.
   d.) Trapping lines to prevent one-pipe circulation.
   e.) High thermostatic storage temperatures.
4. Miscellaneous considerations such as location of and drainage from temperature relief valves, use of tempering tank, series hook-up with furnace coil and others.

We will wrestle with the above in the following.

The first phase to be grappled with is proper water pipe sizes. The accompanying tabulation shows water deliveries in gal. per min. at various pressure drops through different lengths of standard sized pipes. Selection of the proper pipe size should be such as to

WATER FLOW IN GALLONS PER MINUTE THROUGH VARIOUS PIPE LENGTH AND PRESSURE DROP

Nominal Size of Pipe in Inches	Pressure Drop in Lbs. Per Sq. In.	Length of Straight Pipe in Feet					
		20	30	50	70	100	150
¼" Copper	30	6.0	4.9	3.8	3.2	2.7	2.2
Tubing	40	6.9	5.7	4.4	3.7	3.1	2.5
Pipe Size	50	7.7	6.3	4.9	4.1	3.5	2.8
	75	9.5	7.7	6.0	5.1	4.2	3.5
⅜" Copper	30	11.9	9.7	7.5	6.4	5.3	4.4
Tubing/Iron ..	40	13.8	11.2	8.7	7.4	6.1	5.0
Pipe Size	50	15.4	12.6	9.7	8.2	6.9	5.6
	75	18.9	15.4	11.9	10.1	8.4	6.9
½" Brass	10	12.4	10.1	7.8	6.6	5.6	4.5
Pipe Iron	20	17.5	14.3	11.1	9.4	7.8	6.4
Pipe Size	30	21.5	17.5	13.6	11.5	9.6	7.8
	40	24.8	20.3	16.1	13.3	11.1	9.1
	50	27.7	22.6	17.5	14.8	12.4	10.1
	75	34.0	27.7	21.5	18.2	15.2	12.4
¾" Galv.	10	24.7	20.1	15.6	13.2	11.0	9.0
Pipe	20	35.0	28.5	22.1	18.6	15.6	12.8
	30	42.7	35.0	27.1	22.7	19.1	15.6
	40	49.2	40.4	31.2	26.4	22.1	17.9
	50	55.3	45.1	35.7	29.4	24.7	20.1
	75	67.6	55.3	42.8	36.2	30.2	24.7
1" Galv.	10	45.2	37.0	28.6	24.2	20.2	16.5
Pipe	20	64.0	52.2	40.5	34.2	28.6	23.4
	30	78.4	64.0	49.5	41.9	35.0	28.6
	40	90.5	73.9	57.2	48.4	40.5	33.0
	50	101.2	82.6	64.0	54.1	45.2	36.9
	75	123.9	101.1	78.4	66.2	55.4	45.2
1¼"	10	60.4	49.4	38.2	32.3	27.0	22.6
	20	85.0	70.8	54.8	45.5	38.0	31.3
	30	105.2	85.9	66.5	56.3	47.0	38.4
	40	120.8	98.8	76.4	64.7	54.0	44.1
	50	136.3	111.5	86.2	73 9	60.9	49.7
	75	167.0	136.5	105.6	89.4	74.6	60.9
2"	10	197.0	161.1	124.5	105.4	88.0	71.9
	20	279.8	228.7	176.8	149.7	125.0	102.2
	30	342.3	280.0	216.4	183.3	153.0	125.0
	40	393.7	312.0	249.0	210.9	176.0	143.8
	50	441.1	360.9	279.1	236.2	197.3	161.2
	75	541.0	442.3	342.2	289.5	241.8	197.5

deliver and provide adequate pressure at the faucet (say 5 lb.) for the volume of water desired (say a bathtub H-faucet with a 6 gal. flow per min.), with a minimum water pressure available at the outlet of the storage tank (say 55 lb.) which is located, say, 35 ft. horizontally from the bathtub faucet. Taking the above conditions, let's work out an example and lend the same practicability by assuming that the tub in question is also situated 14 ft. vertically above the tank. Since a water column 2.309 ft. in height exerts a pressure of 1 lb. per sq. in. and since we are reckoning with a 14 ft. lift, then $14 \div 2.309 = 6.1$ lb. must be lost due to the static head caused by height of the tub above the tank. Then, since 5 lb. must be available at the fixture, $55 - (5 \div 6.1) = 43.9$ lb., which is the maximum possible pressure that is available for the 6 gal. flow to lose in the $35 \div 14 = 49$ total ft. from the tank to the bathtub. Referring to the accompanying tabulation, we find that at 50 lb. drop in 50 ft. length of pipe that ¼" copper tube will deliver 4.9 gal., ⅜" copper tubing 9.7 gal., and ½" pipe (essentially the same pressure drop for either brass or iron) 17.5 gal. Since we desire to deliver only 6 gal., the ⅜" copper in this case will suffice. If a wash basin requiring 4 gal. per min. additional hot water were located alongside of the bath, the total water simultaneously deliverable would be $6 \div 4 = 10$ gal. which, under the foregoing conditions, would require a ½" pipe.* These conditions were selected at random as being average but your familiarity with this general design method and with the water pressures available in your territory will be beneficial. With a bit of practice you can figure with the "best of them."

In order to fully arm yourself, consideration ought to be given to the pressure effect of pipe fittings which, obviously, offer more resistance to the flow of water than that of the same length of straight pipe. The following table, therefore, is presented to show the factor which, if multiplied by the nominal diameter in inches of the fitting in question, will result in the approximate equivalent length of straight pipe expressed in feet:

	Factor
90 deg. elbow	2
90 deg. elbow—long sweep	1
45 deg. elbow	1
Tee	2
Reducer	2-4
Gate Valve	1
Globe Valve	2

For instance, suppose that in the case cited above there was included in the 49 ft. of ½" (0.5) pipe, a 1-globe valve, 2-tees and 3-90 deg. elbows, then $2 \times .5 + 2 \times .5 + 3 \times 2 \times .5 = 1 + 2 + 3 = 6$ ft., or the added equivalent length of pipe due to these fittings, thus making the total effective pipe length $49 + 6 = 55$ ft. Inspection of the accompanying pipe flow capacity tabulation will indicate that at the rate of 10 gal. delivery per min. the ½" size will still be adequate at the new effective length.

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11,808 Btu. per mo. per ft. of pipe. Translated into 525 Btu. gas with a 75% heater "all on" operating efficiency the monthly consumption would be $\frac{11,808}{525} \div .75 = 30$ cu. ft. per lineal ft. of pipe to overcome this differential. In a layout with, say, 35 ft. of pipe this loss would amount to 35 × 30 = 1,050 cu. ft. per mo., a quite sizeable amount. But notice that this calculation was for 1" pipe. Supposing that ⅜" pipe were capable of supplying the demands and was accordingly used as having a 35.4 Btu. loss per hr. at a 60° F. differential, then 1,050× 35.4 ÷ 64.8 = 573 cu. ft., a monthly saving in this element of loss totaling 45.4% merely by the use of the smaller size pipe. Thus by cutting down the heat content exposed to loss with the smaller diameter pipe, a material economy can be made. This sample calculation forceably illustrates the prime necessity of allowing a pipe size sufficient only to effect proper pressure at the faucet. Don't needlessly oversize hot water pipe!

Next your attention is called to the effect of insulating hot water lines with a 1" standard air cell asbestos jacket, which can be seen by again comparing columns 7 and 8. With a ½" iron pipe the hourly Btu. losses at a 60° F. differential are, respectively, 42.2 for bare and 8.2 for insulated pipe, from which it appears that insulation is responsible for a 78% reduction in the rate of pipe heat losses. Inasmuch as the majority of water-heating installations are put in houses with an existing plumbing system it is impractical to insulate any hot water pipe other than that exposed in the basement. The cost of standard air-cell insulation material varies from $5.00 to $8.00 per 100 feet, depending upon the diameter, the installed cost being 10 to 25 cents per ft. The economic desirability of insulation must, of course, be calculated for each locality but its general advisability can readily be appreciated by taking normal conditions such as 30 ft. of ¾" pipe, an assumed 700 cu. ft. of equivalent gas loss per mo. at $1.00 per Mcf., and 20 cents per installed ft. cost of insulation in which the initial insulation cost of $6.00 would effect an annual saving of $8.40—pretty good investment. The hourly Btu. losses shown in the accompanying tabulation of data were determined in an atmosphere having only slight, normal air currents. Cold winds from broken cellar windows or in open basements will accelerate such heat dissipation as well as tend to lower the average atmospheric temperature.

We are now brought to the question of how long does it take for a hot water pipe to cool off to atmospheric temperature. In a previous article we discussed briefly the subject of specific heat in which an example of the total heat content above 70° F. of a ¾" pipe full of water at 130 ° F. was worked out showing 21.426 Btu. per lineal ft. Knowing the total heat content of any given size of pipe and the rate at which heat is dissipated therefrom it is possible to calculate the length of time taken for a pipe system to cool off, hence the following table for common sizes:

Size	*Total Heat Content Per ft. Per Degree*	*Time to Cool Through 60° F.*
⅜" Copper	0.1400 Btu.	14 minutes
½" Bare iron	0.2341 Btu.	20 minutes
½" Insulated iron ..	0.2396 Btu.	94 minutes
¾" Bare iron	0.3571 Btu.	25 minutes
¾" Insulated iron ..	0.3628 Btu.	115 minutes

Note that the above is the time elapsed in cooling completely through a full 60° F., other temperature drops will be to all intent and purpose directly proportional as to time. Thus with a ½" bare pipe starting at 130° F. temperature, 15 minutes after the closing of the faucet the hot water will have dropped 60 × 15 ÷ 20 — 45° F. or to a temperature of 130 — 45 — 85° F., which the housewife wastes upon subsequent opening of the faucet. Therefore it is reasonable to conclude that except with insulated piping systems the major portion of the hot water remaining in the piping system after closing of the faucet is normally wasted.

DATA ON PIPE DIAMETERS AND WEIGHTS, WATER PIPE STORAGE CAPACITIES, HEAT LOSS AND EQUIVALENT GAS CONSUMPTION

1 Nominal Size in Inches	2 Outside Diameter Inches	3 Interior Diameter Inches	4 Weight of Pipe Per Ft. Lb.	5 Outside Area Per Ft. of Pipe Sq. Ft.	6 Gallons Per Ft. of Pipe Length	7 Heat Loss Per Hr. Per Foot of Pipe Length, in Btu.	8	9 Monthly Gas Consumption Equivalent to Heat Loss Per Ft. of Pipe Length	10
						Bare	Insulated	Bare	Insulated
¼ Copper	.540	0.375	.459	.142	.005	27.9		38.3	
¼ Copper	.675	0.494	.644	.177	.010	35.4		48.5	
½ Brass	.840	0.625	.911	.221	.016	40.6	8.8	74.2	16.1
½ Iron	.840	0.625	.84	.221	.016	42.2	9.2	77.2	16.8
¾ Iron	1.050	0.820	1.12	.275	.028	52.3	11.4	95.6	20.8
1 Iron	1.315	1.050	1.67	.334	.045	64.8	13.8	118.6	25.1
1¼ Iron	1.660	1.380	2.24	.434	.078	80.1	17.5	146.4	32.0
1½ Iron	1.900	1.610	2.68	.497	.106	90.7	18.7	165.8	34.1
2 Iron	2.375	2.070	3.61	.621	.174	111.8	19.9	204.6	36.4

Notes: a. Heat Loss per hr., cols. 7 and 8, and Monthly Gas Consumption, cols. 9 and 10, are based on an average water temperature of 130°F., with an average air temperature of 70°F., or a temperature difference of 60°F. For purposes of rough calculation, heat loss, or equivalent gas consumption, is in direct proportion to the temperature differences. Thus for a 20°F. temperature differential $\frac{20}{60} \times 95.6 = 31.9$ cu. ft. or the equivalent gas consumption per mo. per lineal ft. of bare ¾" pipe.

b. The thermal or operating efficiency of the water heater is assumed as being 75% as a basis for the calculation of equivalent gas consumption, cols. 9 and 10.

c. The thermal value of the gas is taken to be 525 Btu. For different gases multiply by the following factors:

500 Btu. — 1.050 530 Btu. — 0.991
510 Btu. — 1.029 540 Btu. — 0.972
520 Btu. — 1.010 550 Btu. — 0.955

In the last mentioned tabulation concerning "Data on Pipe Diameters ———" under column 6 is listed the "Gallons per Ft. of Pipe Length." For instance, 1 ft. of a ¾" pipe contains .028 gal. whereas ⅜" tubing contains .010 gal. Think of the effect of this intensely dry statement on the housewife. Assume that 40 ft. of ¾" pipe connects the heater to the faucet—that means 40 × .028 — 1.12 gal. of "under temperature" water must be withdrawn before hot water is available at the point of use.* Is this waste of the first order of significance? Contemplate the effect of such a common circumstance as say, 10 such withdrawals a day — 10 × 1.12 — 11.2 gal. wasted which, when considered in the light of total hot water use per average customer of in the neighborhood of 45 gal. per day, is of paramount importance. In considering ways and means of reducing this substantial gas loss it is well to analyze the specific gal. per ft. effect of the use of a smaller sized pipe such as a ⅜" tubing in place of a bare ¾" pipe — (.028 — .010) ÷ .028 — 64.3% saving in this element of loss. A similar comparison shows that a ⅜" tubing will save 37.5% when replacing a ½" pipe. In extreme cases long pipe runs cause delay in securing hot water at the faucet and hence are a source of inconvenience to the customer. Again beware of oversized hot water pipes!

In the foregoing it is noteworthy that concern has been not so much with the point of location within the home at which the *greatest amount* or total volume of hot water is used (usually the bathroom) but rather with where the hot water faucet is turned on and off the *greatest number of times* during the day (usually the kitchen). It is almost self-evident that the length of hot water pipe runs as well as diameters and insulation condition the heat losses incident to the piping system irrespective of the type of heater equipment employed; therefore proper location of the heater itself with respect to the time interval of hot water used at the various faucets, is most essential. These facts have led several large utilities to adopt the policy of (1) placing the heater as near to the kitchen sink as possible even at the expense of increasing the length of the pipe, provided adequate draft can be maintained, (2) making a separate ⅜" copper tubing connection to the kitchen faucet apart from the main piping system, (3) reinstalling improperly laid out hot water piping systems with the minimum sizes compatible with available hydraulic pressures and customer hot water demands. Benefits of good location are manifestly more pronounced with an automatic heater in that the constant availability of hot water encourages spasmodic uses such as more frequent hand washing and miscellaneous kitchen tasks. By the same token in restaurants, homes with light housekeeping, churches and like places where although the monthly hot water volume might be large, the uses are not frequent, the pipe losses are not as great as in normal homes, specially where there are small children. The results of these practices generally have been excellent.

Several companies have standardized on copper tubing for the installation of all reasonably short pipe runs from domestic automatic storage heaters. Among the advantages attributable to the use of copper tubing may be listed the following: (1) Practical freedom from the corrosive effects of most water, the material is essentially a lifetime proposition; (2) interior surface smoothness greatly diminishes pipe clogging from mineral and vegetable matter thus tending to retain original flow capacity; (3) use of small diameters causes a high velocity of the water thereby bringing about a flushing action; (4) flexibility of tubing eliminates necessity for the sharp bends of ordinary pipe ells reducing friction losses and stoppages caused in such fittings; (5) flexibility of tubing permits direct runs to risers, thereby shortening hot water lines; (6) flexibility decreases installation labor by practically eliminating the fitting work involved in rigid piping (particularly true if traps are employed); (7) flexibility increases the percentage of net salvage value if removal is resorted to; (8) reduction in number of gallons of water in piping system, decreases the total operating cost of gas water heating. In the opinion of many the use of copper tubing will increase rapidly as a thorough comprehension of water heater problems becomes more general.

Little is understood about the phenomenon known as one-pipe hot water circulation. Pooh-poohed by many skeptics, it is, nevertheless, a well established fact that hot water will and does frequently circulate inside of a single pipe with the result that the average temperature in the piping system approaches in some instances that of the heater. Partial one-pipe circulation is more frequent and may be readily detected by placing the hand on the pipe to ascertain increasing temperatures the closer one gets to the heater. As might be naturally supposed, this maintenance of a continued high temperature in the water lines markedly increases heat losses which, as stated above, are dependent upon the difference between water and atmospheric conditions. Many theories have been advanced as to the piping layouts that are conducive to bringing about one-pipe circulation, but knowledge of the causes is so generally meagre that it is impossible to predict whether or not the phenomenon will occur in any given piping system. Some observers believe that hot water lines rising vertically close to the storage tank promote this condition. The larger the pipe the greater will be the heat loss and also the more certain that one-pipe circulation exists. Although the condition occurs most often in hot water lines it has been observed in cold water lines. Suffice here to say that in nearly one out of five systems some circulation can be observed. To eliminate any possibility of this condition existing, many companies have made it a standard policy to trap all storage heaters at the hot water outlet. An example of such a trap is shown in the accompanying illustration of the "Sample installation ———." Electric competitors regard one-pipe circulation as a problem of sufficient consequence as to provide built-in hot water traps in the majority of their storage heaters.

In the exceedingly large homes of the estate variety full circulating hot water systems have been frequently installed. The object obviously is to have hot water instantly available at every faucet outlet by constant circulation through a return hot water pipe system, irrespective of the consequent pipe heat losses. This practice was in vogue even in the more modest homes to a surprising extent at one time. Needless to say, this method was and still is an absurd luxury.

What percentage of the gas burned for water heating purposes in the ordinary home represents heat lost in the piping system? Our previous studies indicate that this loss might amount to anything from 5% to 200%, depending, as we have seen, on length and size

(Continued on page 42)

**Sight should not be lost of the fact that the pipe walls will also have to be reheated before the flowing water can be fully equal to the storage temperature of the heater. It was previously demonstrated that of the heat added to a ¾" pipe full of water, the total of 0.3571 Btu. required per lineal foot was made up of 0.2339 Btu. to heat the water and 0.1232 Btu. to heat the pipe material. Thus the heat loss of the iron is roughly 50% of that of the water.*

HANDLEY BROWN Revolutionary

Left—"Before"—Old style range boiler with furnace coil and non-automatic heater.

Below—"After"—Quickly, easily, cheaply converted into an automatic storage heater by Mirro-Shell . . . an attractive addition to the home; equal in appearance, and operating as efficiently as a factory-built heater.

PRIME FEATURES with OPERATING and SALES APPEAL

●

Single unit combining heating element and insulation.

Condensation completely eliminated.

No circulating troubles; circulation achieved through natural law: no mechanical controls needed.

No liming, no sediment troubles.

Low-pressure regulator, thermostat and safety pilot standard equipment.

No water connections needed for installation.

Finish: Attractive Morocco finish on 24-gauge steel jacket.

Announce a New Method of Gas Water Heating . . . .

This is one of the most important load building, load protecting and sales making announcements made to the gas industry.

A revolutionary new water heating method—tested and proved—is going to open a BRAND NEW STRATA of sales; reach that VAST UNTOUCHED MARKET of moderate and low-income consumers.

From now on you can confidently and successfully go after a tremendous field with a low-priced, low-installment cost, low-consumption appliance:

MIRRO-SHELL

MAKES AN AUTOMATIC STORAGE WATER HEATER OUT OF THE OLD RANGE BOILER — AND LISTS AT $34.75

The Mirro-Shell utilizes an entirely new principle of heat transference. It is performed by a new method of combining radiation, reflection and absorption of heat. No water connections necessary: the Mirro-Shell is placed around the boiler, top insulation applied, a ⅜" gas line is connected, burner and thermostat assembly attached—and the job is done! Installation expense surprisingly low; service problems minimized; tank failure responsibility eliminated.

Low First Cost (list $34.75—subject to your local pricing, furnace coil trade-in, terms, etc.) opens your market. **Low operating costs** makes its use practical in this market. In regions where water conditions require high-priced non-ferrous metal tanks, as well as where galvanized steel tanks are used, the Mirro-Shell conversion feature solves the water heater sales problem.

Simplicity, low price and broad market hold strong appeal for co-operating dealers.

Operating and sales executives will find this revolutionary water heating method of prime importance to load building plans. Write now for full details, prices, terms—and be on the way to this most desirable and permanent gas load.

HANDLEY BROWN HEATER CO.

JACKSON MICHIGAN

Developers and Pioneers of the Low-input Gas Water Heater

OH BOY!
HAS THERE BEEN A BIG CHANGE AT YOUR HOUSE?
"DADDY ISN'T CROSS ANY MORE AND MOTHER LOOKS SO RESTED AND CONTENTED"
THEY INSTALLED
GAS HEAT

Get Started with House Heating Displays This Month

by Stuart Bratesman

Manager, Display Dept.,
Boston Cons. Gas Co.

WITH the return of summer vacationists, and the ensuing increase in the number of people who daily pass your display windows, the time is ripe to "bear down" on the presentation of the many advantages of automatic gas house heating, with effective display advertising. Make it a point to include at least two house heating displays in your September display plans.

There is a time in early fall, between the summer months and the real cool weather, when gas heating merchandising should be played up in your displays, with ceaseless repetition. This is the time of year when lots of people are "on the fence," so to speak. Get your heating messages to this type of individual with colorful window advertising. It costs less to prepare, and reaches more people per dollar invested, than any other form of advertising.

In preparation for the coming heating season, along with other activities connected with the cleaning and checking-up of installed equipment, it is always sound merchandising to place what we call a "reminder display" in your key window. There are many methods and copy angles that can be used as a gas heating reminder; reproduced with these lines is one. Study it. It contains nothing except the one idea of "what is to come." That's enough. Let your follow-up displays tell the story of gas heating, in detail.

The other heating display shown on this page can be used a bit later in the heating season, but is shown here because of its surefire appeal. There are very few normal people who will pass by an advertisement of this type and not get some sort of a definite reaction. We all know how far-reaching the appeal of a baby can be. Tied-in with gas heating in this breezy, yet practical manner, it becomes doubly effective.

Both of these heating display advertisements were painted in tempera water color paints on beaverboard that was braced from behind with light pine frames. There is a very definite reason for this type of material and construction. As these sets were eight feet square, to fit the show windows of the company, something more substantial than heavy cardboard had to be used. The tempera water color paints go on the areas smoother, and last longer than other inexpensive poster paints. One large gas company has experimented quite successfully with lacquers, but the average small Display Department budget demands a poster type of cold water paint. Over a period of years it has been found that carefully selected colors will last quite a while, by moving at regular intervals. Select the most brilliant and lasting colors from at least four lines of paint and your color problem will be solved. No single paint manufacturer makes a complete line of strong poster paints, today.

Get started with your gas heating displays this month. Don't wait until the snow falls. There's much that can be done before then, and remember, window displays reach hundreds of people, day and night, at low cost.

"SUCCESSFUL SELLING"

The American Gas Association Domestic Range Committee recently announced the sixty gas companies operating in the United States and Canada that have won distinction in the Association's First Gas Range Sales Contest. The list appears elsewhere in this issue.

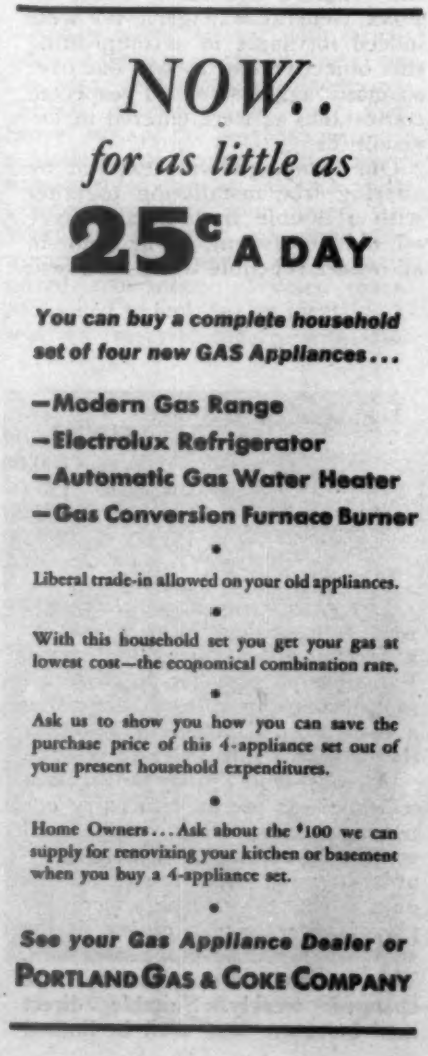
Here are stories by sales executives of a few of the winning gas companies giving the highlights of their campaigns. Many novel ideas on publicity and advertising, dealer cooperation, salesmen's contests and financing of merchandising are incorporated.

"Household Set" Campaign Brings Good Results

IN planning the 1935 residential sales program for the Portland Gas & Coke Company, Portland, Oregon, the principal objective was to substantially increase the use of gas of present customers, according to B. H. Parkinson, Commercial Manager. Such a program could not most effectively be accomplished through seasonal campaigns of one class of service appliance; rather all classes of appliances would have to be sold without regard to the season of the year. The answer appeared to be a "household set" campaign. After considerable study, including a market survey, the following offer was developed:

> "We offer you a set of household gas appliances to render a completely automatic household service; that is, a 1935 model Electrolux gas refrigerator, a modern 1935 model gas range with full porcelain, automatic top lighting, insulated oven and temperature control, an automatic gas storage water heater and an automatic gas home heating service; no down payment, a liberal allowance for your old equipment, with payments as low as 25 cents a day, and we will show you how to save this payment out of your present household expenses. If you are a home owner, we offer you up to $100 in cash as a loan for renovising your kitchen or weather stripping your house, or for constructing an additional room in your basement in the space no longer required for fuel storage."

This household set was not a "fixed package." The customer was permitted a selection of size and finish of refrigerator, a selection of ranges, a selection of size of automatic storage water heater and a selection of central heating equipment. The demonstration as to how the 25 cents a day could be saved from present household expenditures was made in part through the promotional residential rate for domestic gas service used in combination with gas househeating and in part through the refrigeration story of savings in food through quantity buying and avoiding food spoilage. The 25 cents a day amounted to five years terms. A subsidiary finance company was organized to secure a Federal Housing Administration insurance contract against loss through repossesions on such long terms. To carry out our policy that we do not compete with our dealers as to down payments, terms, carrying charges, trade-in allowances or brand of appliances, the facilities of this finance company were made available to the dealers.


NOW..
for as little as
25c A DAY
You can buy a complete household set of four new GAS Appliances...
—Modern Gas Range
—Electrolux Refrigerator
—Automatic Gas Water Heater
—Gas Conversion Furnace Burner
Liberal trade-in allowed on your old appliances.
With this household set you get your gas at lowest cost—the economical combination rate.
Ask us to show you how you can save the purchase price of this 4-appliance set out of your present household expenditures.
Home Owners... Ask about the $100 we can supply for renovizing your kitchen or basement when you buy a 4-appliance set.
See your Gas Appliance Dealer or
PORTLAND GAS & COKE COMPANY

The company salesmen, company employees, plumber dealers, department store and furniture store salesmen, architects and builders, kitchen specialists and equipment people, in co-operation with gas appliance manufacturers, were organized through an animated campaign vehicle known as the "Big Game Hunt." Each animal in the Big Game Hunt represented a particular appliance, which was assigned a point value as a common denominator to determine individual and team performance. This game hunt was divided into four divisions—the department store, furniture store and hardware store division, the plumber dealer division, company employees' division and company salesmens' division. Separate kick-off meetings were held for each division with appropriate jungle surroundings in the lighting of an artificial bonfire. Weekly progress charts were issued for each division. A total of 4,921 gas appliances were sold during the months

Sensational
COOPERATIVE OFFER
BUY YOUR GAS RANGE AT REGULAR PRICES
AND GET YOUR CHOICE OF THESE....
Extra Features
Worth $20.00
AT NO ADDITIONAL CHARGE
3 modern types of Gas Ranges
GAS RANGES IN THIS COOPERATIVE PLAN
PORTLAND GAS & COKE COMPANY

of April, May and June, including 635 Electrolux refrigerators, 1,856 gas ranges, 1,110 automatic storage water heaters, 242 gas conversion burners and 104 gas designed central heating plants. This campaign was very effective in again popularizing gas for all purposes in our highly electric competitive territory, and has emphasized our promotional residential rate.

It has been the endeavor of this company for the past year and a half to popularize full featured gas ranges. Three separate dealer-manufacturer-utility co-operative campaigns for the sale of fully equipped gas ranges were conducted during 1934, each with progressively effective results. The months of April and May, 1935 were selected by this company as a basis for measuring performance in the National Gas Range Sales Contest. To give further impetus to the sale of full featured gas ranges, a special customer purchase inducement was made consisting of a bracket cooking top lamp, electric clock, minute reminder, set of four condiment jars, which were given away free with each purchase of a modern gas range having automatic top lighting, temperature control, insulated oven and full porcelain, retailing at $74.50 net and over without kitchen heater and $119.50 net with Kitchen heater as an integral part of the range. This customer inducement unit was advertised as having a retail value of $20.00. The cost of the unit in most instances was $12.00, but not less than $9.00, shared two and one-fourth by the dealer, two and one-fourth by the manufacturer and the balance, but not exceeding $7.50, by the Portland Gas & Coke Company. Range sales of this class during the contest were: the utility, 440; net dollars, $54,121; average price, $123.00; dealers, 530; net dollars, $65,285.05; average price, $123.18; total ranges, 970; net dollars, $119,406.05; average price, $123.10. Total dollar sales of ranges per 100 meters was $157.75.

The Portland Gas and Coke Company won first place in Division II (50,000 to 100,000 meters).

Employe Enthusiasm Helps Company Win First Place

THE Missouri Natural Gas Company, Farmington, Mo., entered the recent National Gas Range Sales Contest sponsored by the American Gas Association with the full determination to be up among the winners, according to J. M. Foxx, General Manager. We were indeed fortunate in accomplishing this objective and to win out over so many aggressive and respected contestants as were entered in Division V.

Our campaign was featured by offering free installation together with a double trade-in allowance on old equipment. Our trade-in allowance schedule was as follows:

	Regular Trade-In Allowance	*Contest Period* Double Trade-In Allowance
Ranges up to $ 50.00	$ 5.00	$10.00
from 51.00 to $ 75.00	7.50	15.00
76.00 to 100.00	10.00	20.00
101.00 to 125.00	12.50	25.00
126.00 to 150.00	15.00	30.00
151.00 to 175.00	17.50	35.00
over 176.00	20.00	40.00

List prices shown on all ranges were term selling prices subject to a discount of 5% for cash purchase. For deferred payment purchase arrangements were offered comprising a cash down payment of 5% with the balance divided over 18 months.

A consistent display advertising schedule was prepared to carry our message to the public via the local weekly newspapers. Timely placards stressing the features of our offer during the campaign were displayed with the gas ranges in the show windows and on the sales floor. The window arrangements were changed weekly. Suitable direct mail literature was used in limited quantities. Price lists, descriptive literature and sales catalogs were furnished all employees of every department. Co-operation with the sales department was stressed at every opportunity. Remuneration for leads that resulted in sales were paid to the employees of other departments in the form of a bonus of approximately 2½% of the net sales price of the gas range. This bonus was deducted from the salesperson's commission.

Weekly pep meetings of the members of the sales department were held to maintain organization enthusiasm. Friendly inter-organization competition was a part of our program with a company award of $100.00 cash offered to the winner with the provision, however, that the company place in the contest awards.

Outstanding in our sales department were Mr. H. D. Boyd, who sold 59 gas ranges of a total of 166 company sales for a dollar volume of $3,676.00, and Mr. K. J. Roeder, who sold 46 gas ranges for a dollar volume of $3,266.17. Total dollar sales for the company per 100 meters were $576.55.

The most gratifying feature of the entire campaign was the splendid display of enthusiasm, aggressiveness and persistency evident among all employees throughout the property during this contest.

Advertising and Publicity Campaign Outstanding Feature

THE WASHINGTON GAS LIGHT COMPANY'S two-month 1935 Spring Modern Gas Range Campaign was the biggest and most extensive selling activity yet attempted by the Company, according to F. D. Dingnell, Asst. General Sales Manager. With honors in the National Range Contest as the primary incentive we set out to correlate all range outlets in an intensive drive to replace as many as possible of the great number of obsolete ranges in Washington kitchens with fully equipped Modern Gas Ranges. There were many obstructions in the path of such a far-reaching program. But in testimony of our eventual success stands the final figure of 2,413 Modern Gas Ranges sold and installed, and Second Place in "Division A" of the National Gas Range Sales Contest (100,000 or more domestic meters). Of this total the Gas Company itself accounted for 1,118 of the sales, which in a two-month period almost equalled the 1,358 gas range sales made in the *first six months* of 1934. In this local campaign we consider the extensive advertising and publicity campaign carried on to be the most outstanding feature. Following is a short outline of this program:

Program

Although the local campaign did not begin until March 15th, definite action toward intensive range selling was made necessary late in January by competition, just then forging into the open. Newspaper advertising flourished with claims of "Modern Cookery" as against "Old Fashioned Flame-type Methods" which necessitated combative action.

First, it was necessary to decide upon a method of advertising reply to the flagrant competitive claims, not only to prevent competitive progress, but to pave the way for our campaign. Our first impulse was to resort to similar advertising tactics. But replies of this nature would inevitably have led to an open "claim and counter claim" war, which would benefit nobody.

The more ethical, yet highly competitive, theme adopted for advertising was centered around the expression "I'm Buying a Modern Gas Range" in advertisements featuring only the heads of chic, modern women. Consistent promotion was done on this idea in frequent small space advertising. First, this simple, yet subtly powerful statement answered all claims of competition with a final suggestive decision coming from a modern woman. Second, by continual pounding of the word "modern," ultra-modern lettering and layout, and by its association with the smart women illustrated, it definitely established the gas range as modern. Third, it incited curiosity and a desire to buy which was amply capitalized on in the actual campaign. While results of this carefully aimed barrage were immediately felt in sales, the greatest part of its effect was accumulated to burst forth on announcement of the sale on March 15th.

Trade-in Allowance

Active selling started with large-space advertisements by the Gas Company and dealers announcing "$15.00 Allowance for your Old Stove" toward the purchase price of a Modern Gas Range. These were supplemented by an all-type Gas Company advertisement titled "A Word to Women" informing the women of Washington of the concerted movement. Women were counselled to look for an identifying seal (a reverse square with the wording, "Buy a Modern Gas Range") carried in all ads, to make sure that the range they bought was strictly modern. Throughout the campaign frequent individual sale ads by dealers and the Gas Company were tied together by general Gas Company ads keeping the movement as a whole before the public.

Pile of Old Ranges Traded in For Modern Gas Ranges.

To add to the great amount of direct advertising done, newspaper publicity was also employed. All old stoves traded in on new ones were dumped onto a steadily mounting pile. Pictures were taken of the pile at various stages of its growth, and the news angle was featured in stories carried in newspapers. The effect of publicity and general advertising was to make women of Washington actualy kitchen conscious. Many sales resulted in purchasers remodeling their whole kitchens to fit in with the appearance of their smart Modern Gas Ranges. Women have connected Modern Gas Ranges with beautiful homes and kitchens and with the new freedom from tiresome household duties which this modern age is giving to housewives.

Salesmen's Competition

The means by which competitive interest was aroused among the Gas Company salesmen is perhaps of equal interest.

Competition, the life-blood of every sales contest, centered around an automobile race, "The 1935 Modern Gas Range Speed Classic." The "motordrome" on which each salesman was represented by a "Sir Malcolm Campbell" type racing car, was an elaborate and colorful replica of a typical race track. Set up on a 4' x 12' table of wallboard, the light oval of the track made a striking contrast against the dark green of the "infield." The grandstand, complete even to the cheering thousands, along with shrubs, trees and colorful billboards advertising Modern Gas Ranges, lent realism to the picture. The track itself was divided into 100 spaces, each representing one sale. The first 25 spaces painted in white were the first division of the sale. The second division, painted tan, extended from 25 sales to quota (59 sales). The "stretch" from 59 to 100 sales was brown. Each sales pushed the car of the salesman another notch

around the track, daily and total sales being recorded on a "parimutual" tabular placed on the infield. At five-space intervals small flags notified the passing cars of the total bonus money won to date. A tow car was put on the track to give a "lift" to any laggards, upon whom the fast pace seemed to be telling. As the sale progressed, and first one car and then another forged ahead, interest reached fever heat. Extra competition was aroused by another contest between two teams led and chosen by the high men of last year's campaign. These teams were matched against each other, the winning team being the guests at a dinner given by the General Sales Manager, H. M. Brundage, Jr., at the end of the campaign. The captain of the winning team received $10.00 and each member $5.00. This type of contest, by salesmen with teams chosen by themselves, injected a great deal of personal rivalry and enthusiasm into the campaign.

This campaign has served to show us the tremendous market open to aggressive gas range selling with the result that we are planning a greater effort for the coming Fall.

Customer Inducements and Dealer Cooperation Important Factors

WEST TENNESSEE POWER & LIGHT CO., Jackson, Tenn., won second prize of Division V (1000 to 5000 meters) and Clem R. Winkler, Commercial Manager, describes interesting features of this campaign:

The activity was known as the "Good Fortune" Campaign To Sell Modern Natural Gas Ranges, playing up the "Modernize Your Home" slogan of the Better Housing Program of the F.H.A.

A leader range was selected and the manufacturer agreed to substitute for its regular trade name, the name "Modern Gas Range" on the manifold panel. In addition, three other ranges, were included in the set-up and all efforts directed to these models. Dealers were given the opportunity of purchasing from us any of the leader models at our warehouse cost, or of featuring ranges of their own selection.

Demonstration Coach

In keeping with the "Good Fortune" theme, a sales coach was fitted up with the four ranges featured. These ranges were all connected to a bottle of Shellgas, so that actual demonstrations could be made of the features of the ranges to the housewives visiting the coach. This coach was known as the "Good Fortune" Caravan, and was manned by two Junior Salesmen, each uniformed as Fortune Tellers. Uniform consisted of black trousers, with silver stripe, black cape with grey lining and grey turban. Junior Salesmen also carried a crystal ball, so arranged that when prospects looked in a small lamp was lighted, revealing a modern gas range.

Advertising consisted of newspaper, direct-mail in the form of enclosures with service bills, broadsides for use of Junior Salesmen, outdoor posters and tire covers.

A kitchen heater was given with each range, retailing for $40.00 or more cash and AGA Approved, sold during the activity. Heater must have been connected at the time the range was installed, six feet of piping included with the heater. Additional piping was charged for at the rate of 15c per foot. These heaters were sold by us to dealers at $1.00. This feature of the activity was to overcome a local problem, as few of our customers' homes are centrally heated and one of the reasons for still cooking with solid fuels is to provide heat for the kitchen during the winter months.

Free Piping

In order to attract those prospects whose houses were not piped, free yard lines, not to exceed 50 feet, were given to purchasers of gas ranges from either dealers or company. This was limited to houses located on present gas mains. In the event the yard line exceeded 50 feet, customer could secure same by paying for the excess over 50 feet at the regular charges.

Trade-in Allowances, ranging from $10.00 to $25.00, depending upon the price of the range purchased, were made by both dealers and company.

Ranges were sold with a down-payment of approximately 10% of the cash price and balance extended over a period of 24 months.

Dealer Financing

When laying out this phase of the activity, it was foreseen that some dealer dissension might be encountered because of their inability to finance range sales over a two-year period. Therefore, the matter was taken up with two local financing agencies, who after weighing the matter carefully, agreed to handle the paper for the dealers over a period of 24 months, where the cash price was $40.00 or more. The carrying charge agreed upon was $5.00 plus 10% of the cash price of the range. Prices of the 4 leader models were set-up on this basis and identical prices quoted by all participating agencies.

"Good Fortune" Caravan with Fortune Tellers

Junior Salesmen were paid a salary plus a bonus on range sales for either the account of the dealer or the company as follows:

$1.25 for each AGA Approved, Insulated Oven and Temperature Control Gas Range.
.75 for each other AGA Approved Gas Range.

No bonus was paid to Junior Salesmen for ranges sold by dealers which were not AGA Approved.

Senior Salesmen were paid their regular compensation on ranges sold by them for the account of the Company or for ranges sold in their territories by Junior Salesmen.

Company employes were also paid a bonus on prospects turned in which resulted in sales.

L. C. Wilkinson, West Tennessee Power and Light Company, Jackson, Tennessee, was high ranking salesman.

Rhea Dabney, W. P. Dabney & Sons, Jackson, Tennessee, was second high ranking salesman.

A Campaign For More And Better Gas Ranges

THE successful promotion of any appliance sales activity in small communities often involves in addition to the features common to any successful campaign certain local circumstances peculiar to these territories. Participation by The Keystone Gas Company, Inc., in the National Gas Range Contest, which resulted in an award of Third Prize in Division Six, proved no exception to this tendency, according to R. E. Williams, New Business Manager.

District Three of The Keystone Gas Company, Inc., comprises the Towns of Deposit, Hancock and Walton situated in Broome and Delaware Counties, New York. Two of the towns have been piped with natural gas for a period of nearly three years. The third town, Walton, has enjoyed gas service only a few months. The apparently virgin market for new gas ranges in the latter town, however, is somewhat modified by the fact that bottled gas had received a very satisfactory acceptance prior to the advent of natural gas. The bottled gas ranges are in good condition and are fairly new which makes conversion to piped gas a simple operation, a situation very gratifying from a load building point of view but a bit dampening to the spirit of a campaign for new gas range sales.

In view of the degree of bottled gas range saturation, particular emphasis was placed upon the desirability of a modern gas range with insulation, heat control and automatic top lighter. The effect of this appeal may be determined from the fact that the sales of modern gas ranges have almost equalled the conversion of bottled gas equipment. Of course, the majority of the new ranges were sold to new customers, many of whom had never used gas before.

A rather encouraging indication in the campaign was the fact that the average selling price of the gas ranges was $83, with allowances and discounts deducted. Only six ranges were sold other than "fully equipped." Ranges were priced at regular dealer mark-up, an allowance of $10 was given for the old stove and terms were 24 months maximum.

A cooperative dealer arrangement under which the Gas Company consigned gas ranges to the dealer, closed his leads and paid him a commission and installation fee on gas ranges sold to his prospects, assisted very materially in the success of the campaign. Relatively few independent dealer and mail order gas ranges were sold in the territory.

Possibly the most helpful simple factor in the campaign was a series of gas cooking schools conducted by the Home Service Director for the district. Her thorough demonstration of the modern gas range and its place in the modern kitchen crystallized into action many an housewife who thought she "'couldn't spend the money just then."

The entire personnel of the organization entered into the campaign with enthusiasm which proved of inestimable assistance to the local manager, who, with full time salesman and a sales-service man, shared honors of the successful campaign.

"See The Features" Contest Stimulates Public Interest

D. A. STRICKLAND, Sales Manager of the United Gas System, Houston, Texas, sent the following highlights of their 1935 range activities in the National Range Contest, which resulted in winning second place of Division II (50,000 to 100,000 meters):

"The campaign was conducted in cooperation with dealers in the territory. A printed prospectus was mailed to every dealer in advance of the campaign, outlining the program and urging individual participation. This was followed up by personal contacts to secure cooperative effort.

See the Features

"To stimulate public interest in the new models, a 'See the Features' Gas Range Contest was conducted for a period of three weeks prior to the opening of the national competition.

"To qualify for the prizes, every contestant had to visit a dealer's store or company office and secure an entry blank. The entry blank listed thirty-four features found on modern gas ranges. The contestant was asked to identify twelve of these features by filling in the name of a particular range after each feature identified. They were further asked to visit two different stores in order that they might inspect at least two different lines of gas ranges. For the balance of the contest, each person was required to write one hundred words or less on the subject 'What I Like Best About Cooking With Gas.' To stimulate widespread interest and participation, the company territory was divided into three zones, and identical prizes were awarded in each zone. The prizes awarded were gas appliances—refrigerators and water heaters. These awards were made rather than ranges, because the company did not want to appear to show any favoritism by selecting a gas range from its own stock or that of any individual dealer, since practically every leading gas range manufacturer's products were being displayed in dealers' stores and company offices.

Style Show

"At Beaumont, Texas, the campaign proper was officially opened with a style show, in which—through a series of tableaus and dialogues—

(Continued on page 48)

Gas Water Heater Display in Telephone Company's Window

ONE of the most interesting cases of co-operation between two public utilities has developed in Washington, D. C.

The Chesapeake and Potomac Telephone Company of Washington has two regular commercial display windows on the Thirteenth Street side of their main office building. They use these windows part of the time for their own display covering the development of the telephone industry and also from time to time grants the use of these windows to some of their commercial telephone subscribers who make requests for the use of the windows.

In May of this year the Edgar Morris Sales Company, Southern Distributors for the Pittsburg Water Heater Corporation, applied for the use of one of these windows for a 15 day period and the request was granted.

A photograph of this window is shown and it should be noted that the cards which were part of the display specifically invite the window observer "For information telephone your plumber, your gas company, or Edgar Morris Sales Company, National-1031."

The Washington Gas Light Company cooperated with the Edgar Morris Sales Company by lending for this display use a portion of the background which had previously been used on their display floor.

The C & P Telephone Company allowed the Edgar Morris Sales Company to place in the display room back of this window, which is part of their commercial office, a quantity of descriptive folders on Pittsburg Water Heaters and a commercial representative of the telephone company was on duty to answer questions about the water heaters and to distribute the folders to anyone who might ask questions.

Mr. John A. Remon, General Manager of the Chesapeake and Potomac Telephone Company of Washington, wrote Edgar Morris, on June 3, 1935, as follows:

"Your exhibit has occasioned a number of favorable comments and it is our opinion that it should be effective in the stimulation of calls leading to the sale of Pittsburg Gas Water Heaters."

The C. and P. Telephone Company realizes that the more business their subscribers develop the more the telephone will be used and for this reason are generous in their interest in the development of the business of their commercial subscribers.

Dealers Profit in "Old Fashioned Sales Contest"

MASTER plumbers and other approved gas appliance dealers are jingling about $6,000 in their pockets as a result of winning prizes in the "Old Fashioned Sales Contest" conducted by The Brooklyn Gas Co. for its dealers during April, May and June. All retail sales of ranges, refrigerators and water heaters made by dealers during these months counted in the contest, provided deliveries were made by July 15.

The contest differed from the usual run of sales competitions in that prizes were not awarded on the basis of dealers finishing first, second or third. Instead every dealer who could sell three refrigerators or water heaters or six ranges won a cash prize for each appliance sold. This was in addition to his regular commission or discount on the sale.

The prizes were as follows:

Refrigerators		*Ranges*		*Water Heaters*	
3-4	$2.00 / ref.	6-7	$2.00 / rge.	3-4	$2.00 / wtr. htr.
5-7	2.50 / "	8-9	2.25 / "	5-7	2.50 / " "
8-10	3.00 / "	10 & up	2.50 / "	8-10	3.00 / " "
11-14	3.50 / "			11-14	3.50 / " "
15-19	4.00 / "			15-19	4.00 / " "
20 & up	5.00 / "			20 & up	5.00 / " "

During the contest dealers won prizes, totalling $5,659.00. A total of 2770 appliances was sold by the dealers during the three months. Incidentally the three months were the best three months in dealer business since the start of dealer cooperation in the Brooklyn Union territory six years ago.

From the start of the contest the dealers showed considerable interest in pushing appliance sales. The success of the contest is indicated by the amount of prize money won and the number of appliances sold. Throughout Brooklyn and Queens dealers are well pleased, especially those among the big money winners.

The race for the honor of winning the largest amount of prize money was particularly keen, especially during June, the final month of the contest when Paul Preusser, of Brooklyn, and A. J. Wagner, of Queens, entered a neck-and-neck race. Preusser occupied the lead from the start of the contest but lost out to the final challenge of Wagner, who closed with a rush that brought him victory.

2 NEW RECORD MAKERS

Pittsburg SAVE-OMATIC

50 gals. of hot water per day—1500 gals. per month—100° F. water rise—535 B.T.U. gas—3370 cu. ft. per month—slow recovery economy with twice the available hot water.

Pittsburg WATERMATIC

(Thermostatically controlled)

50 gals. of hot water per day—1500 gals. per month—100° F. water rise—535 B.T.U. gas—3590 cu. ft. per month—capacity 4 gals. per minute.

The consumption performance tests shown here were made in strict conformity with tests made for the American Gas Association by Massachusetts Institute of Technology on Comparative Water Heating Costs 1935.

Both models outperformed the best results obtained by any heaters of their types in the M.I.T. Tests.

Prove the story of Pittsburg's economy to yourself—write for a trial test heater today, with service efficiency tests.

THE PITTSBURG WATER HEATER CORPORATION
PITTSBURGH, PA.

AUGUST

carries on the record-breaking

REFRIGERATION SALES SUCCESS

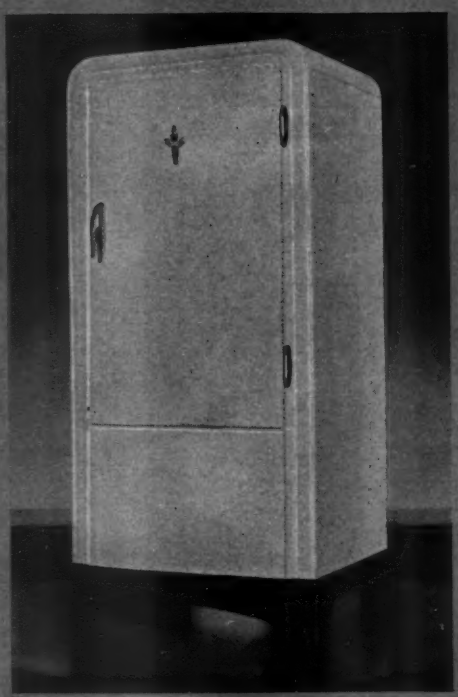
of gas companies from coast to coast

THE SUCCESS FORECAST by the *instant appeal* of the 1935 Electrolux is being confirmed and reconfirmed! During August, orders for gas refrigerators continued to mount throughout the country . . . easily maintained the fast sales pace set early this year.

Thanks to aggressive gas company cooperation—to intelligently directed sales strategy and forceful advertising—more and more families each month are discovering the greater efficiency, beauty and convenience which only Electrolux can offer.

Sales for the past half year give ample evidence of the ability of gas refrigeration to win out single-handed against the combined forces of competitive automatic refrigeration selling. In Southern California, for example, Electrolux has far outstripped all other makes of refrigerators. And, in other sections, similar records are rapidly being achieved.

To gas companies anxious to make sure that every refrigerator installed in their territory is a *gas* refrigerator, the months ahead offer an important opportunity. For today it is certain: *1935 is gas refrigeration's year!* Servel, Inc., Electrolux Refrigerator Sales Division, Evansville, Indiana.



NEW *Air-Cooled*

ELECTROLUX

THE SERVEL *Gas* REFRIGERATOR

'The Colonel's Commentary

By Wm. H. Matlack

Here we are on the threshold of another day.

What we get out of fall and winter spending will depend upon what we put into it. Times look promising but we are not out of the woods and while a clearing appears ahead we see a lot of underbrush that has to be cleared away before we again come into the open.

High pressure selling stumps have been blasted, the foot-in-the-door salesman has gone his way; we have seen the fallacy of trimming our advertising appropriations too close.

We have discovered that a number of so called load building items that we got excited about burn no B. T. U's. We have discovered that through the neglect of the circulating gas water heater we have passed up some mighty worth while business. We have found that folks who have gotten along with tank heaters for years will buy the modern conversion type heaters if properly and consistently approached. We find that there is a market for incinerators, garage heaters, room heaters, ironers, laundry stoves and dryers IF we will but tell folks about them early and often.

"THE BIG SHOW Is On, Folks"
94 Gas Range Dealers
Visit Your Gas Range Dealer Today
BIG SHOW
Ask Your Gas Range Dealer About Liberal Trade-In Allowances
THE LACLEDE GAS LIGHT COMPANY

In short during the days, weeks, months and years just past we have learned a lot of things. We have learned that there is a market for many things but that it takes a lot of careful digging to uncover them. We have found that we have to support our advertising by personal effort, by store and window displays. We have learned that we must advertise continuously and consistently:—we have found that we have to show folks that they have a *need* for our wares and then by diligent and painstaking effort show them that we have an appliance to fill that need. In short we have "come to ourselves."

The fall and winter of 1935 should be good periods for gas men who are willing to discard old ideas and get out from under their *stuff*. There will be no five day week or six hour day for the gas man who wishes to be "setting pretty." Twelve months hence, on the contrary, the fellow who finds himself in that position will find that he has had to do a lot of *planning* and *plugging* but that it has been worth it.

* * *

Househeating Sales Idea

We've been told that a Pittsburgh Gas Company has provided its service men with neat little Taylor Thermometers and instructed them to leave them in all gas heated homes they visit, the idea being that indoor temperatures may be checked against outside, showing what comforts gas actually brings to the home.

Another company over in Illinois is using the same type thermometer as an excuse for salesmen to call back on prospects for gas home heating. This company insists that the presentation of the thermometer and carefree home heating story be made in the evening, when both the master and mistress of the house are at home.

* * *

Dealer Tie-In

"The Big Show" is the title of an advertisement (see reproduction) used by the Laclede Gas Light Company to tell folks in St. Louis that ninety-four dealers in that city have something up-to-the-minute in the way of gas ranges on display—the more dealers you get to selling gas appliances the more load you're going to have.

Hot Water Advertisement

The Laclede Gas Light Company had an urge for rhyme when they wrote the advertisement we reproduce on this page. We like it. It is human and we'd say that's the kind of ads that bring business to the gas man and the plumber-dealer in St. Louis. It helps solve the ever-present problem in a large family.

* * *

Space Heater Displays

September offers the display man many opportunities to build outstanding window displays. Cool days are especially good days on which to tell of the beauty and usefulness of the Radiant gas fires. Displays of the new models in both the window and store will start sales booming. One man is planning to build small individual booths to display several models of gas fires across an entire wall of his store. The booths will be in the form of fire places of different period designs. The designs are copies of the fireplaces built by two manufacturers to display their lines at special exhibits. They are built of composition board and covered with a plastic cement and decorated with paint tints.

Solution Of The Problem Of Dead End Main Extension

IT is an old and continuous topic and problem, as to how extensions can be made to dead end gas mains, with no interference to the prevailing service.

Many attempts were made to find a solution to this problem but none answered the requirements of safety, economy and last but not least the absolute independence from the prevailing service. Thousands and thousands of dead end mains are buried in the ground which will become an obstacle whenever the main is to be extended, because there is not a device or method which would permit the straight extension of a main. If a valve was installed on

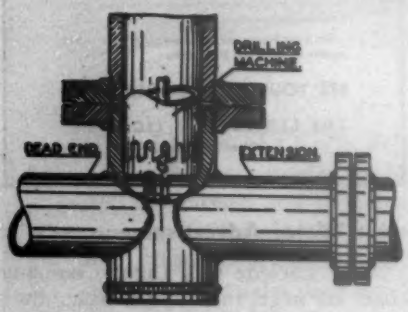


Figure 2

Showing the "Dutch" Method for Joining under Pressure Dead End Main and Extension.

the dead end this valve has a practical use but once, at the time of the extension. This is the only case when a pressure line could be extended straight and without a shutdown, but not without the help of a previously built in valve. The side tapping of a main is a poor substitution of the straight, valveless extension. The side tapping always includes the reduction of the size of the main and the change of the direction of the flow of the gas, which are the biggest factors in the drop of the pressure. Of course, a valve, whether the service requires or not, must be left in the ground as a potential place of a leakage on a medium or high pressure main.

When the conditions require a straight extension of the main with no reduction in the size of the main at the valveless dead end, there was but one choice, to shut down the main together with the side branches and then to perform the extension. This was what the gas engineers always dreaded.

Every gas engineer knows the inconveniences and possible detrimental consequences of such an interruption of the service in spite of all the precautions.

To avoid the intricate manipulations of a shut down in case of a dead end main removal or extension of a service main, and to eliminate mostly a needless valve, and save all the troubles which are involved in such operation a very simple method and fitting was devised by Mr. E. I. Dutch, construction engineer of Westchester Lighting Company, Mt. Vernon, N. Y.

Maintains Service

This device not only permits to maintain the service at the time of the extension or dead end main removal but simultaneously it is as ready to extend end of the main also. As the accompanying sketch shows there is not a valve at the extended main and the size of the main is not changed either. Being a straight extension no pressure loss is caused by such an extension. The drilling apparatus and the Tee fitting, which is named Branchhead by Mr. Dutch, are rather standard tools in the tool cart.

The Branch head is the connecting link between the main and extension, being as integral a part of the main as a line drip pot. This link might be the run of a Tee fitting tapped opposite to the bull, or a piece of pipe tapped diametrically opposite places to receive the dead

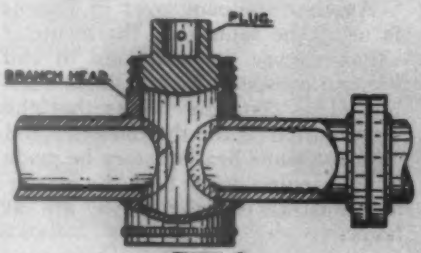


Figure 3

Showing the Jointed Main and Extension. (Section View.)

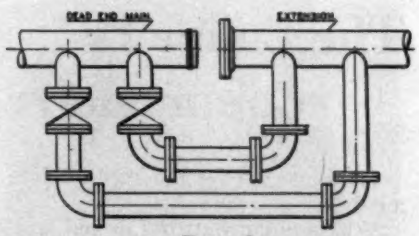


Figure 1

Showing the Old Method of Extending Dead End Mains

end main and the extension. The Branch-head is closed on one end and open on the other end. The open end is provided with male and female threading. The external threading is required for the temporary employment of the drilling machine and valve. The internal threading receives the plug after the dead end main within the Branch-head has been removed by the core drill. Due to this double threading, extra heavy pipe should be used for Branch head. Also it should be one size larger than the main in question. A standard plug may be used to close up the Branch-head.

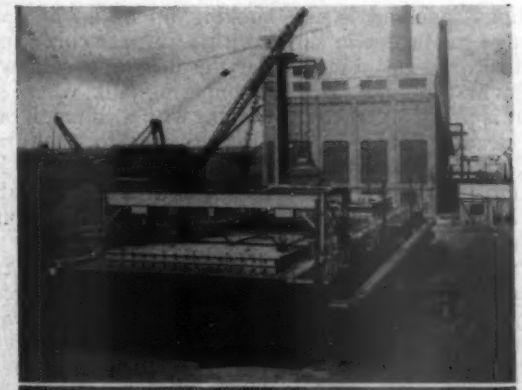
When this connecting link is properly prepared, it should be welded gastight to the dead end main and extension in such a manner, that the welded blank flange of the main in a diametrical position shall take place in the branch-head. This requirement is very important, because otherwise the core drill will not remove completely the blank flange.

The next step in the operation is to apply the drilling machine to the open end of the Branch-head through a gate valve, and to remove the blank end of the main and so as to open the passage for the gas flow into the new extension without interfering with the prevailing service. After withdrawing the core into the stuffing box of the drilling machine and closing the gate valve, the plug takes the place of the core drill. This is inserted into the open end of the Branch-head through the reopened gate valve. Now the whole drilling apparatus together with the valve may be removed and the main and extension are joined as shown on Fig. 3.

Important Factors

Experiments and actual installations proved this method to be simple, inexpensive, safe, and absolutely independent from the prevailing service, which are most important factors in the maintenance and operations of the gas service.

PURIFIERS CONDENSERS HOLDERS COMPLETE PLANTS



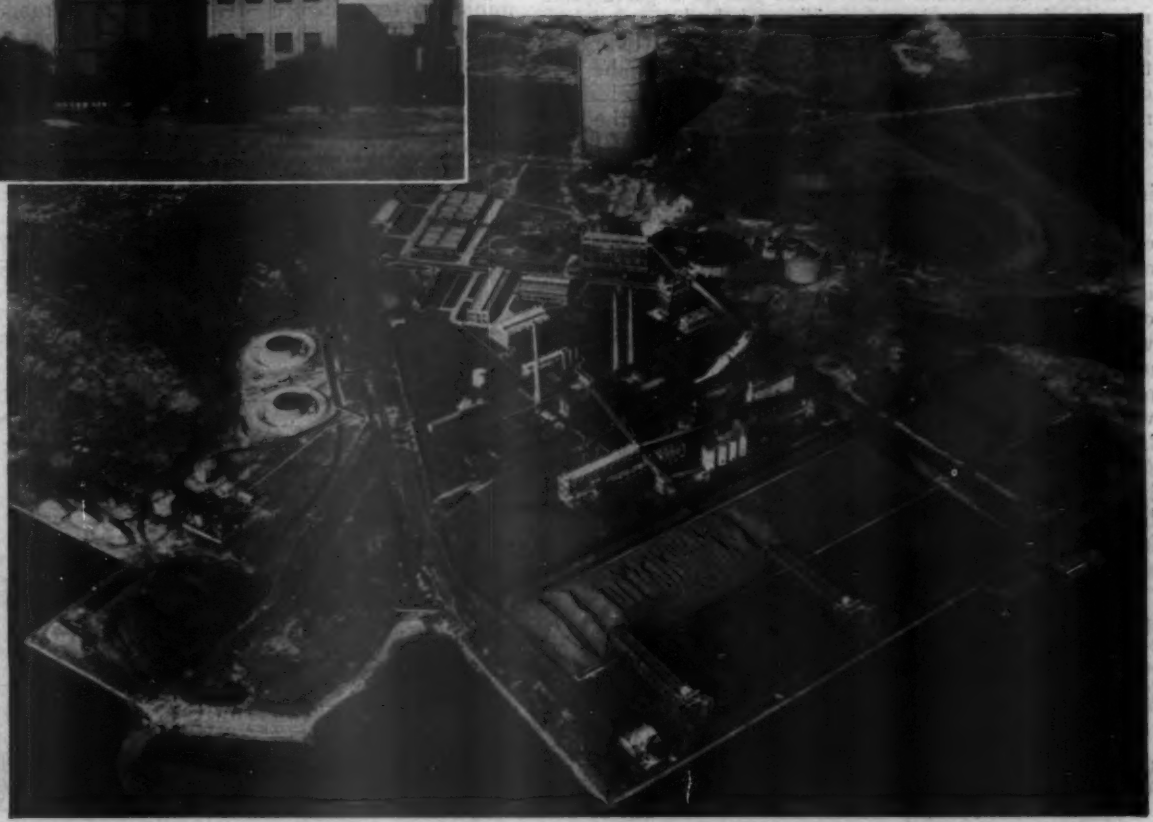
BARTLETT HAYWARD

with a background of over 100 years in contributing to the finer traditions of American Industry—is eminently qualified to make a thorough and complete analysis of your plant requirements and assume the ***undivided responsibility***—from start to finish—of any project you may be contemplating.

THE BARTLETT HAYWARD CO.

BALTIMORE, MARYLAND

FOUNDED 1832



Domestic Gas Utilization

(Continued from page 27)

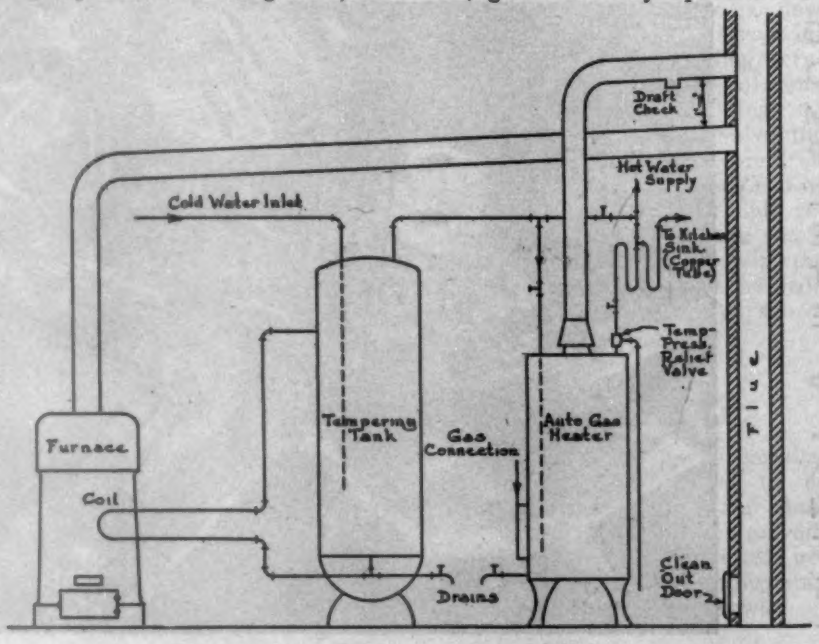
of pipe and many other factors. As a rough approximation the average for exceedingly well installed jobs with insulated basement lines and separate tubing to the sink the loss is probably from 5% to 20%; on straight uninsulated systems from 15% to 45%, assuming in both instances reasonably small pipe diameters.

And now a brief word about faucets. A previous article contained a tabulation showing the number of gallons discharge from ordinary fixtures—think of it, 4 GAL. PER MINUTE from a wash basin faucet. Is it any wonder that, disagreeable though such may be, hotels use snap action, spring faucets? A careless housewife or a negligent servant in a quite brief space of time daily can turn an otherwise satisfactory hot water service into a costly monster. Scratch with your pencil a moment and total the magnitude of the expense involved in say, a mere three wasted minute a day in a needlessly opened hot water faucet. Some companies have gone so far as to include a snap action faucet for the kitchen sink in the standard cost of the heater—and with merit. Leaking faucets have also been previously discussed. It is interesting to observe that to combat the leaky spigot, gas storage heaters are on the market with a small by-pass from the cold to the hot water lines, the by-pass being just large enough to permit a water supply for the leaks and not large enough to noticeably dilute the temperature at full flow. Many view this as "consorting with the devil" on the grounds that rewashering of the hot water faucets will strike at the fundamental cause of leaking faucets. Practice in some companies dictates that on installation of a new heater a complete set of washers be included where necessary.*

In the more severe climates the use of a galvanized range boiler strapped to the ceiling of the basement has proven to be a means of increasing the inlet temperature. Cases are on record substantiating that the decreased water temperature rise can be such as to reduce materially the gas cost of water heating with the use of this unique layout.

Without doubt one of the most chewed upon problems in gas water heating is what disposition to make of the so-called furnace coil. The decision as to proper treatment in most instances rests, primarily, if the consumer has a serviceable coil for heating water in conjunction with either a coal or oil furnace, upon the relative local costs of gas as opposed to coal or oil, a subject whose economics is discussed in a later article of this series. Assuming for the moment that the water entering the gas heater is to be preheated by some other fuel, the accompanying illustration is for the purpose of showing some of the major considerations involved in the hooking up of an automatic storage gas heater in series with a furnace coil. In the picture drawing observe that the incoming cold water enters first into the so-called tempering tank, where sediment is precipitated to the bottom with a common outlet for cleaning, drainage and for progress to the furnace coil. An alternate hook-up, preferred by many, is to have the tank outlet for the furnace coil at a point 6" above the bottom, thus allowing space for the collection of sediment removal through a separate drain cock with but a slight sacrifice in the effective volume of the tank. Because of the readiness of coils to lime in the exceedingly hot furnace combustion chamber, the removal of sediment in the tank is sometimes important to retard coil plugging. Water after absorbing such heat as the fire temperature and velocity within the pipe coil will allow, is returned back to the tempering tank at a point about one-quarter of the height down from the top. This water varying in more or less uncontrolled temperatures, ranging from 90° F. to 225° F., mixes in the usually uninsulated tempering tank awaiting transfer to the pipe leading to the automatic gas heater.

The "Sample Installation ———" shows a by-pass across the top of the heater with valves so arranged as to permit water to, when desired, flow straight from the tempering tank to the hot water supply lines. By closing the valve in the by-pass line, water may be routed through the gas heater which will then be in a position to absorb heat from the gas heater subject to the thermostatic setting, provided there is a deficiency in the temperature of the hot water supplied from the furnace coil. In very low price solid or liquid fuel areas such a hook-up is often used to afford in the winter-time the benefits of the basic water heating with cheap fuel (and it must be decidedly cheap) coupled with the advantages of an automatically regulated service, the gas burning only when needed to heat up to some predetermined thermostatically controlled, minimum temperature. This hook-up method involves the extra expense of two valves and several additional fittings. A more popular hook-up when in series with a furnace coil is to omit the by-pass line (plugged tees being left) and also to eliminate two of the three valves immediately adjacent to the heater. Such an arrangement, of course, gives no ready option as to



Sample Installation of Automatic Gas Storage Heater in series with a furnace coil and tempering tank.

**It is not uncommon in old faucets to find that the seat has been so worn as to be scarred and grooved, thus causing washers to cut in a short time. When encountered the only remedy is to grind the seat down to a smooth, even surface.*

whether or not all water passes through the heater during the entire year.

Note that in the illustration the temperature-pressure relief valve (a recent A. G. A. requirement on all automatic storage heaters) is shown in this case in the hot water outlet line. Inasmuch as furnace coils are subject under heavy firing conditions to delivering water at temperatures sufficiently high to melt out the fusible plug in the relief valve, many feel this position to be desirable because of the added tempering effect of the water contained in the storage of the gas heater.* It is considered good practice to use a tempering tank between the furnace coil and the automatic gas heater as shown, unless the heater is at a considerable distance from the furnace, in order to prevent too frequent popping off of the relief valve. Some advocate the use of the self-seating or self-closing type of relief valve, at a higher initial cost, in order to avoid disturbance to the owner and also extra service work.

Several other points worthy of mention appear in this "Sample Installation ———" among which are the trapping of the hot water line close to the heater with a separately trapped copper tubing to the kitchen sink. Note the possibility for the use of 180° return bends in making up the piping trap, thus eliminating two fittings and procuring a neater installation. Copper, however, naturally facilitates the making of such traps. If hooked in series with a furnace coil or if carrying an unusually high thermostatic setting, care should be taken not to install iron fittings of too small a diameter in such a trap because of the tendency with some waters toward accelerated deposits of calcium and magnesium salts, the liberation of free oxygen and the precipitation of organic matter at high temperatures.**

Observe that there is a copper drain line from the relief valve to the floor in order to prevent possible serious scalding of anyone present in the event of a popping off. This practice should be adhered to in open basements or when heater is placed in living quarters, in the latter case the tubing drain should extend through the floor. However, if the heater is so installed as to permit directing the relief outlet against a cellar wall or a supporting column the tube can be dispensed with. Do not connect such a drain as to permit a concealed discharge.

With all automatic gas heaters a drain cock is provided near the bottom of the tank, the proper use of which will tend to reduce gas consumption, give increased life to tank and / or gas coils and aid in keeping heated water cleaner. In time sediment, dirt, scale and other precipitations will collect in a hot water system. If permitted to remain on surfaces in the high temperature zone this debris becomes baked on, thus resisting transfer of heat into the water and accelerating corrosion. Dealers should allocate the responsibility to some individual, usually the service man, to instruct customers to drain tank every two or three months through the regular cock.

Comment on the method of installing flues as shown is also in order.*** Note the indispensable down-draft diverter (supplied as regular equipment by most manufacturers) at the top of the heater. Also in the flue between the gas heater and chimney note the open leg draft check. The open leg draft check may serve the very useful purpose of killing the excessive pull of unusually heavy drafts and thus reduce heat losses from the heater storage tank or coils. Good practice requires a minimum of 0.02" (water column) draft and a maximum of 0.05", drafts exceeding either the maximal or minimal conditions involving both safety and efficiency problems. However, some companies object to the use of open leg check drafts when connected into a common flue with the furnace. There have been immense debates as to whether the gas heater flue should be inserted into the chimney above or below furnace flues—preference is for a connection above the furnace flue to minimize ash and soot deposits that might more easily block a flue placed below a solid or liquid fuel flue. An important caution, however, is to prevent obstruction caused by flue pipe protruding past the inner chimney wall. When installing make sure that clean out door at the bottom of the chimney has a tight fit and that no sizable cracks are in the chimney walls. When possible short flue runs should be used in order to avoid insufficient draft and condensation from flue products of combustion. Also allow for a reasonable slope or pitch on the flue pipe. A match or candle is an excellent rough means of checking draft conditions at the diverter hood. All automatic gas appliances having a greater than 5,000 Btu. hourly input should be properly vented.

Now after hitting a few of the "high lights" please do not consider yourself a qualified installation expert—this is only intended as an eye-opener. Reread the foregoing carefully, keep your eyes open around a few actual jobs, exercise the "grey matter betwixt the ears" concerning what you see and hear—then take a deep breath laden with self-confidence and go out prepared to do a more intelligent, all-around and forceful sales job.

(Continued in October Issue)

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* *In straight connected jobs, i.e., without the furnace coil, many think it preferable to install the temperature-pressure relief valve in a tee in the incoming cold water line.*

** *The problem of tank deterioration may be studied further in an Am. Gas Assoc. report on "A Survey of Conditions Relating to the Corrosion of Galvanized Water Heater Boiler," Jan. 27, 1933, or in "Hot Water Service," Vol. B, No. 110, by The Cleveland Heater Co. or in the Aug., 1933, issue of the A. G. A. Monthly, pages 345-346.*

*** *Additional information is obtainable in A. G. A. Requirements for House Piping and Appliance Installation.*

Gas Range Sales Contest Awards

Division I

(Companies with 100,000 or more domestic meters)

1ST PRIZE WINNER—Southern Counties Gas Co., Clyde H. Potter, Com. Mgr., Los Angeles, Calif.

2ND PRIZE WINNER—Washington Gas Light Co., H. M. Brundage, Jr., Gen. Sales Mgr., Washington, D. C.

3RD PRIZE WINNER—Union Gas & Electric Co., F. S. Dewey, Gen. Sales Mgr., Cincinnati, Ohio.

Honorable Mention

Southern California Gas Co., Los Angeles, Calif.
The Laclede Gas Light Co., St. Louis, Mo.
The Philadelphia Gas Works Co., Philadelphia, Pa.
New York Power and Light Corp., Albany, N. Y.
Minneapolis Gas Light Co., Minneapolis, Minn.
Westchester Lighting Co., Mt. Vernon, N. Y.
Public Service Electric & Gas Co., Newark, N. J.

Division II

(Companies with 50,000 to 100,000 domestic meters)

1ST PRIZE WINNER—Portland Gas & Coke Co., B. H. Parkinson, Com. Mgr., Portland, Ore.
2ND PRIZE WINNER—United Gas System, Dean A. Strickland, Sales Mgr., Houston, Tex.
3RD PRIZE WINNER—The Dayton Power & Light Co., K. C. Long, V. P., Dayton, Ohio.

Honorable Mention

Western United Gas and Electric Co., Aurora, Ill.
Pennsylvania Power & Light Co., Allentown, Pa.
New Haven Gas Light Co., New Haven, Conn.
Dallas Gas Co., Dallas, Tex.
Kansas City Gas Co., Kansas City, Mo.
The Syracuse Lighting Co., Inc., Syracuse, N. Y.
Providence Gas Co., Providence, R. I.

Division III

(Companies with 20,000 to 50,000 domestic meters)

1ST PRIZE WINNER—Memphis Power & Light Co., Robt. C. Anderson, Residential Sales Mgr., Memphis, Tenn.
2ND PRIZE WINNER—Dominion Natural Gas Co., Ltd., Geo. L. Schofield, New Bus. Mgr., Buffalo, N. Y.
3RD PRIZE WINNER—Consumers Power Co., H. H. Koelbel, Pontiac, Mich.

Honorable Mention

Consolidated Electric & Gas Co., Roanoke Dist., Hagerstown, Md.
The Wichita Gas Co., Wichita, Kans.
North Shore Gas Co., Waukegan, Ill.
Delaware Power & Light Co., Wilmington, Del.
Consumers Power Co., Flint, Mich.
Atlanta Gas Light Co., Atlanta, Ga.
Seattle Gas Co., Seattle, Wash.

Division IV

(Companies with 5,000 to 20,000 domestic meters)

1ST PRIZE WINNER—Texas Natural Gas Utilities, Frank C. Smith, Gen. Mgr., Houston, Tex.
2ND PRIZE WINNER—Iowa-Nebraska Light & Power Co., (Outside properties), Edward Taber, Mdse. Sales Director, Lincoln, Neb.
3RD PRIZE WINNER—Peoples Natural Gas Co., Roy L. Harrison, Supt. of Distribution, Omaha. Neb.

Honorable Mention

Battle Creek Gas Co., J. Frank Jones, Sales Manager, Battle Creek, Mich.
The Newport Gas Light Co., Newport, R. I.
The Hutchinson Gas Co., Hutchinson, Kans.
Peoples Gas Co., Glassboro, N. J.
South Carolina Power Co., Charleston, S. C.
Muskegon Gas Co., Muskegon, Mich.
County Gas Co., Atlantic Highlands, N. J.
Knoxville Gas Co., Knoxville, Tenn.

Division V

(Companies with 1,000 to 5,000 domestic meters)

1ST PRIZE WINNER—Missouri Natural Gas Co., J. M. Foxx, Gen. Mgr., Farmington, Mo.
2ND PRIZE WINNER—West Tennessee Power & Light Co., Clem R. Winkler, Com. Mgr., Jackson, Tenn.
3RD PRIZE WINNER—Tyler Gas Service Co., R. L. Simms, Sales Mgr., Tyler, Texas.

Honorable Mention

The Petersburg Gas Co., Petersburg, Va.
Union Public Service Co., Beloit, Kans.
Montana Dakota Power Co., Rapid City, S. D.
Albuquerque Natural Gas Co., Santa Fe, N. M.
Arkansas Western Gas Co., Fayetteville, Ark.
Gettysburg Gas Corp., Gettysburg, Pa.
Georgia Natural Gas Corp., Atlanta, Ga.

Division VI

(Companies with 1,000 or less domestic meters)

1ST PRIZE WINNER—Georgia Natural Gas Corp., Lee E. Hurst, Supt., Thomaston, Ga.
2ND PRIZE WINNER—The Keystone Gas Co., R. E. Williams, New Bus. Mgr., Binghamton, N. Y., (Division #3).
3RD PRIZE WINNER—Georgia Public Utilities Co., E. J. Stern, V. P., Aiken, S. C.

Honorable Mention

Anderson Gas & Utilities Co., Anderson, S. C.
Ozark Distributing Co., Carrolltown, Mo.
Sumter Gas and Power Co., Sumter, S. C.
Georgia Public Utilities Corp., Athens, Ga.
The Eastern Shore Gas Co., Pocomoke City, Md.
New York Central Electric Corp., Penn Yan, N. Y.
Bowdoin Utilities Co., Glasgow, Mont.

The Sliding Scale Rate

(Continued from page 14)

which may be due to consumers under the plan herein specified, the company may give general notice by advertisement published once a week for two successive weeks in some newspaper having a general circulation in Ann Arbor, that such rate of refund or return to the consumer has been fixed, and all consumers entitled to refund who shall not have received or presented a claim for such refund to the company within sixty days shall be deemed to have waived their right to such refund or return.

"Consumers taking gas three months or less in any year and not being consumers at the beginning or closing of the year shall not be eligible to receive consumers' dividends, nor shall consumers who are receiving gas at other than standard rates be entitled to this dividend.

"Shares to which otherwise such consumers would have been entitled shall, after setting aside from the amount thereof a definite sum as reserve for bad debts and uncollectible bills, be credited to and treated as miscellaneous income."

Method of Fixing Rate

"The proposed method of application of the plan of flexible rates is that the Gas Company should, before the beginning of each year, make an estimate of the amount of gas to be sold in the next ensuing year and of the probable operating expenses, and that the rate be set at the first multiple of 5 cents above the rate determined therefrom.

"After setting the rate at the beginning of the year, if during that year it becomes evident by reason of change in conditions or otherwise that the gas rate set will not yield sufficient revenues to provide for the deductions from revenues as called for, the company may increase the gas rate to the point which will insure that there will be no deficit at the end of the year."

ENGINEERED for EFFICIENT PERFORMANCE ON YOUR JOB...

Roots CONNERSVILLE

GAS PUMPS
METERS
EXHAUSTERS
BLOWERS
INERT GAS PURGING MACHINES

TOMORROW'S ENGINEERING APPROVED BY YESTERDAY'S EXPERIENCE

Roots-Connersville Centrifugal Blowers are designed and built by men whose life work has been devoted to the perfection of efficient equipment for the movement of air and gases. The above steam turbine drive blower is furnishing the air for a water gas set. Quiet operation is one of the features of this design. A complete line of water gas blowers for electric and steam turbine drive is available. A recommendation which may show savings in operation and upkeep will be furnished without obligation.

Roots-Connersville Blower Corp.
CONNERSVILLE, INDIANA

All sizes up to 3,400 cu. ft. capacity

Meters
Diaphragms
Repairs
Provers
Pumps
Calorimeters
Wet Meters
Gauges
Apparatus

METER REPAIR PARTS
FOR
ALL MAKES - ALL SIZES OF METERS

LARGEST GAS COMPANIES NOW
USING OUR PARTS

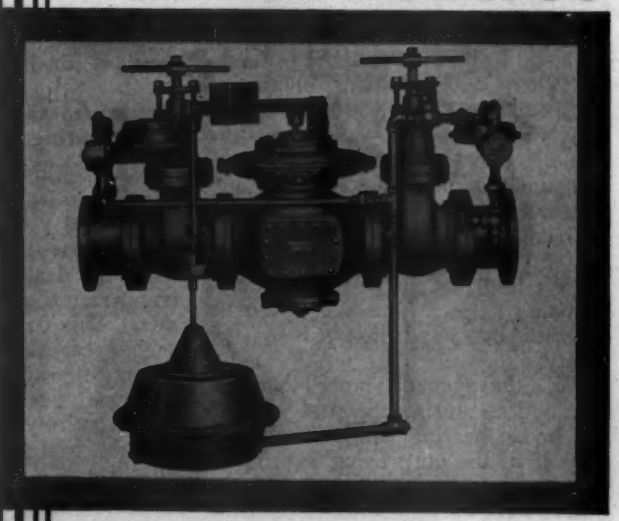
SEND FOR OUR CIRCULAR ON METER REPAIR PARTS

SAMPLES AND PRICES
GLADLY SENT

—•—

LAMBERT METER CO.
BUSH TERM. BLDG. 4, BROOKLYN, N. Y.

Performance



Above—Reynolds Single Station District Regulator

Reynolds Toggle Type Regulators for industrial gas control offer these features:

Removable valve pocket and orifices—side hand holes—streamlining that does not change direction of the flow of gas, increasing capacity and range—*pressure reduction from pounds to pounds and pounds to inches W.C.—single or double valve construction—spring or dead weight type adjustment and equipped with or without pilot control.

Regardless of how unusual or difficult the requirement, there is a REYNOLDS engineer ready to give you the correct answer. Many manufacturers who desire greater safety and accuracy on their products regularly consult with our engineering department. The same service is yours for the asking—write.

*Body of Regulator is so machined that a pounds to pounds diaphragm casing or a pounds to inches W. C. diaphragm casing may be used or interchanged.

REPRESENTATIVES
Eastern Appliance Company, Boston, Mass.
F. E. Newberry, Avon, New Jersey
G. H. Unkefer, 428 Boyd St., Los Angeles, Calif.

REYNOLDS BRANCH OFFICES
421 Dwight Building, Kansas City, Missouri
2nd Unit, Santa Fe Building, Dallas, Texas

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

Servicing Gas House Heating Installation

(Continued from page 10)

any prospects they can assist us with, or to give us leads.

"When our salesman obtains a prospect, we call on the gas company's engineer to measure the home. Our salesman usually accompanies him. The engineer figures out the heat loss from the measurements, and makes an estimate of the cost of heating the home.

"We find that the co-operative advertising helps a lot. We try to tie in with every ad inserted by the utility.

"We have made more than 30 installations during the past year of gas house heating equipment, probably 25 of the units being leased and eventually sold on contract, while the others were outright sales at the time of the installation.

"Our company enjoys doing business with the New York State Electric and Gas Corporation, whose co-operative efforts have done us a lot of good."

Engineer's Assistance Valuable

Norman Davies of Treman, King & Company, hardware merchants and tinners, told me "the utility tries to play fair and does play fair" through its co-operative merchandising plan.

"We have salesmen canvassing the field for the sale of gas house heating, but we never run into utility competition.

"The utility's engineer is of inestimable value to us. He lays out the job for us, and recommends the right size of burner.

"Prior to sales campaigns the utility calls the various dealers together for a luncheon or dinner, and gives each a quota. The company co-operates with us in every way possible so that we reach our goal.

"The utility co-operates, too, by allowing us to display a conversion burner on its sales floor, each dealer being given the same opportunity during a certain period of time.

"We stay in the conversion burner business only, since we do not want to compete with the plumbers for the larger equipment. Being hardware merchants and tinners, we do considerable business with the plumbers and do not care to go into great competition with them.

"There used to be a lot of competition between the dealers over the sale of gas house heating, but since the co-operative plan has been under way, it has weeded out the unprogressive dealers and as a result there are just four left.

"I think the dealer co-operative setup is ideal."

Concentrates on Gas Heating

N. E. Eldridge, manager of appliance sales for the Jamieson-McKinney Co., Inc., plumbers, told me he was impressed by the fact that "the dealer who gives the most co-operation gets the most co-operation. This co-operation has been of such great value to us that in the past two years we have not sold a single oil burner, but have concentrated entirely on gas heating.

"We find that the house calls our salesman makes with the utility company's gas engineer aids us in putting across the gas heating idea to a prospect who may be only lukewarm to the proposition. We may not be able to get into the home to tell the prospect all the little hings concerning the advantage of gas heating, but the engineer, since he has nothing to sell, can often obtain an entree. We dwell at length on the convenience and economy of gas heating, and delay the talk about a lease or sale until after the estimate is made.

"Practically all our installations are made on a rental basis, for that is the easiest way to get them into the home. We argue that the customer can verify our statements, during a six month's trial, that gas is the most satisfactory way to heat a home—viewing the question from all angles. The only disadvantage of the lease plan that we have discovered is that we have not sold as many straight fire jobs as we should.

"We have had less than 3 per cent removals of burners installed within the last two years, and none of them were taken out because the cost of operation was greater than the estimate.

"The utility company pays us a $10 bonus when a burner is installed on a rental basis, that company stocking the make of burner carried by us. If the burner is sold later, it is charged back against us.

"When the utility sells a burner, who installs it may depend on the make of burner and what plumber handles that make. The company spreads the installation business around among the various plumbers, who get a flat rate for the installation.

"The rental plan is a confidence builder. The customer does not think so much about the price when he gets a rental. One can talk sale to him later. Sometimes the prospect has more confidence in the plumber than he has in the utility, and the plumber's word gives him additional faith concerning the expense of gas heating. We never recommend gas heating for the home when there are difficulties that should be corrected in the construction of the home prior to its installation.

"The dealer co-operation plan tends to keep prices stable, and prevent chiseling.

"I cannot praise the dealer co-operation program too highly."

Other Features

There are several other points to the dealer co-operation plan, as related to me by the utility company's executives, which are worthy of mention.

The utility sets up quarterly quotas for each gas house heating salesman in its employ, and a premium is given for all business secured over the quota. By the step method of compiling bonuses or premiums, the salesman gets more, on the average, for exceeding his quota by 50 per cent than by 10 per cent; that is, he would receive more than five times as much.

Since the sale of a gas designed furnace job is rated as more permanent than that of a gas conversion burner, the utility's representative realizes a larger bonus for the sale of the former.

If a dealer has the assistance of the utility in attempting to close a sale within the 30-day protection period, but is unable to clinch the deal, the plumber can obtain a further extension of time when there is a chance that the consumer will sign on the dotted line in the near future.

The utility salesman's territory is divided according to the number of meters and its potential lucrativeness in the merchandising of house heating. A salesman covering a section of the city where the financial circumstances of the residents would not compare with others, would be given more metered territory to handle.

When permission is granted to survey a home, either the salesman or the gas engineer may do this work. The salesman, using quadrille paper with a certain scale of so many feet per square, outlines the heated floors in the home, indicat-

(Continued on page 48)

STANDARDIZE

on

SPRAGUE
CAST IRON GAS METERS

and

REGULATORS

for

low, medium, and high pressures

Accurate in Measurement.

Economical in Service.

THE SPRAGUE METER CO.

BRIDGEPORT, CONN.

The
Outstanding
Gas Purifying
Material » » »

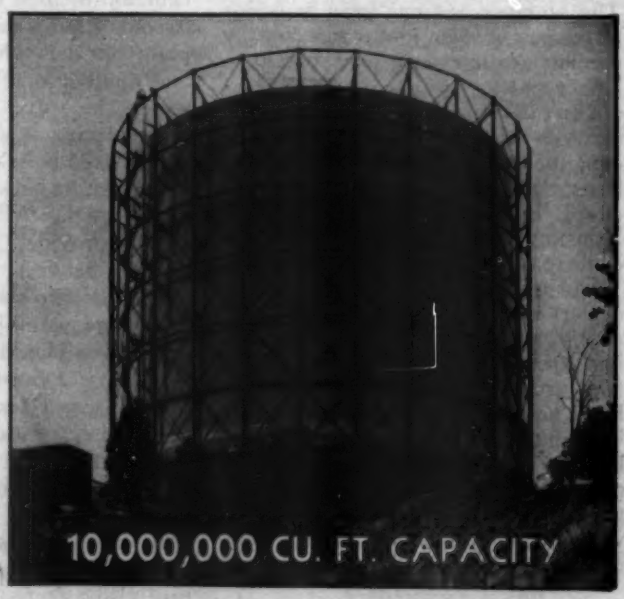
Highest H_2S removal combined with complete removal of traces. Physical structure insures very low box back pressures.

THE RECOGNIZED PURIFYING MATERIAL FOR VAPOR PHASE GUM CONTROL

THE ALPHA-LUX COMPANY, Inc.

192 Front St., New York

Philadelphia **Chicago**



HIGH PRESSURE **GAS HOLDERS** LOW PRESSURE

PURIFIERS · TANKS · CONDENSERS
STEEL PLATE CONSTRUCTION

INTEGRITY GOOD WORKMANSHIP FAIR DEALING

CRUSE-KEMPER CO.
AMBLER, PA.

ing the ceiling height of each room, and size of openings of the windows and doors. Anything unusual in construction, such as insulation, storm windows, or doors, and weatherstrips, is noted. The size and make of the unit boiler, size of the radiator, kind of heat, and size of the gas line is also obtained.

Most homes have a heating problem, and the salesman learns which are hard to heat. He may make recommendations for better insulation. He finds out the rating of the meter, to see if it must be renewed, how the radiators in the home are laid out, and whether the furnace boiler is large enough to heat properly.

The utility's house heating engineer then makes a detailed survey of the cost of heating by gas. Estimates are furnished within 24 hours, and if there is a rush, it is possible for the utility's sales supervisor to figure on the job himself, since he usually is sufficiently trained to do so.

Rentals of conversion burners are made on a $25 down payment, plus $3 per month rental over 10 months of the year, July and August being excluded. The sale price includes the cost of installation, and the utility pays the dealer for his work. The plumber has one year in which to convert a lease into a sale, but by special arrangement may obtain a longer time.

In case of a sale, the dealer finances his own paper when the equipment is sold on a time-payment basis. Some home owners have secured loans through the Federal Housing Administration so that they could pay the dealer in cash.

During the two years that the dealers and the utility have been concentrating on the sale of gas heating through co-operative effort, over 500 installations have been made of home and commercial units in Ithaca. This means that there is a gas house heating installation for every 10 domestic meters, and a commercial unit for every six meters of that variety. This certainly speaks well for utility-dealer co-operative effort.

Gas Pressure Control

(Continued from page 17)

usual diaphragms have withstood the weight. Should tearing occur it will usually be found that the cause is some sharp projection or edge on the diaphragm plates or flanges which cause the diaphragms to be cut from continued movement at that location.

Determining the cause of a slight but continuous odor of gas above a diaphragm is difficult because of the almost universal inability to retain the diaphragm in position and test to determine the exact location. The best policy when doubtful is to change the diaphragm with the usual precautions to avoid a repetition of the leak. Should the difficulty continue the preferable method is to substitute another regulator, bringing the troublesome one into a regular repair shop where the proper equipment would be on hand or easily devised for the testing of each individual section. Repairmen should be cautioned to report regulators where it is practically impossible to stop even a slight leakage so that such regulators may be removed as a safety measure against partial asphyxiation of workmen and to guard against the possibility of the gas accumulating to a dangerous degree.

Valves require more frequent attention than practically any other part of the regulator. The common cause of valve troubles has already been mentioned as foreign matter whether of the liquid or solid variety. Since most line regulators are of the balanced valve type providing valve accessibility is difficult. The most common method of providing access to valves is by means of a handhole plate on the side of the regulator and another on the bottom through which the valves may be removed. In replacing the valves particular care should be taken to assure a uniform contact between the orifice seat and valve disc or surface. Some designs provide a non-adjustable spacer between the two valves which though simple is not usually advantageous as it is practically impossible to obtain valve discs which maintain a sufficiently uniform thickness and texture to secure the standard separating distance. Valve disc texture will affect spacing by changing the moisture absorbing properties which may cause variations in thickness between the time of installation and replacement. Texture also affects the softness and in adjusting it may be found that one of the leathers will depress greater than the other requiring a change in the spacing adjustment. To secure the proper spacing the discs are first properly installed in the cups or other means of holding them firmly in position and the adjustment made to just bring both discs or metallic valves in contact with the orifice seats.

Properly installing valve discs in cups or retainers is essential to prevent any angularity between the face of the discs and the orifice seats. The thickness of discs is accurately gauged during manufacture so that any angularity noted should not be attributed to the discs without a thorough examination of the disc holder, valve spacer, valve stem and any other possible cause. Foreign material may have become lodged between a disc and the disc holder or between the disc holder and valve spacer. The valve may be eccentric with the valve stem or spacer sufficiently to have part of an orifice seat contacting with the curled up section of the disc. The face of the spacer or that part of the valve in contact with the spacer may not be parallel to the orifice seat. The surface of the disc holder may not be parallel to the orifice seat. A bent valve stem would also produce both eccentricity and angularity between disc and orifice seat. Wear on the orifice seats has also been the cause of a gradually increasing angularity of valve discs particularly when the flow past all parts of an orifice are not uniform.

(Continued in October Issue)

"See The Features"

(Continued from page 35)

the evolution of styles in women's wear and corresponding changes in cooking methods was shown from colonial days down to the present. This created a great amount of local interest, and furnished dealers and the company with a number of good prospects.

"The interest of company employees was maintained with a 'Spring Range Roundup' theme. A special prospectus was sent to all employees outlining the program, the selling prices and terms, the company prize awards, as well as the individual awards in the National Contest.

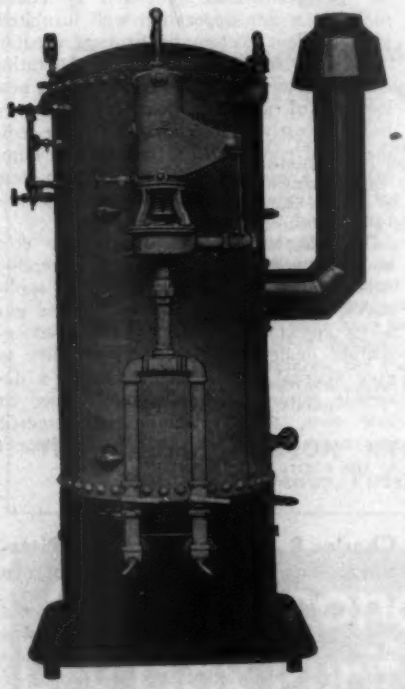
"Company promotion consisted of newspaper advertising, window displays, direct mail, and bill stuffers. Dealers were given equal prominence with the company in all advertising. Specific selling terms were not mentioned, although company terms were kept very conservative, in order that all dealers might feel they were not being handicapped through a more liberal offer on the part of the company. The company campaigned actively for the first month, and left the field open largely to dealers during the last month."

EQUIPMENT NEWS

An Industrial Gas Flueless Boiler

A new development in industrial gas boilers for process steam purposes has just been completed by the P. M. Lattner Mfg. Company of Cedar Rapids, Iowa.

This new boiler is of the internally fired water leg design, and uses the patented H E Flueless heating surface in the furnace to obtain the required high thermal efficiency. This heating surface



is all horizontal, and the vertical heat travel is baffled to contact all of the heating surface.

The simplicity of design should have an appeal to the industrial gas engineer, particularly from the standpoint of cleaning the boiler in order to maintain the high ratio of heat transfer desired in all gas boilers. By removing the burners and lowering the baffle, all heating surface is exposed for inspection or cleaning. This procedure is but a matter of minutes. An interesting feature, is that if the baffle is damaged, the boiler may be operated without it, until repairs are made.

Cleaning the interior of the shell is accomplished by the same process as used with an ordinary vertical flueless shell. Hand hole plates are so located as to facilitate flushing out the water leg where most deposits are made. Scraping the crown sheet may be done through the upper set of plates. There is practically no difference in internal construction between this boiler and an ordinary coal fired flueless boiler other than the baffle and the special type of heating surface. There are no fire tubes nor water tubes nor coils of any kind in it. It should therefore be as troubleproof as any boiler could be expected to be.

This new line of boilers, in sizes from five horsepower to twenty horsepower, will replace the jacket type of H E Flueless boilers which the manufacturer has listed during the past few years. The company claims that this new boiler is a distinct improvement from the standpoints of accessibility and cleaning.

Sound Control Booklet

Deadening or reducing noise produced by mechanical equipment through the use of sound dampening or sound absorbing materials and by isolating vibrating mechanisms is the subject of a brochure recently published by Johns-Manville.

It contains an instructive discussion of the problem of sound control in air conditioning systems, mechanical refrigerators, oil burners, metal furniture and other equipment, as well as a description of the various materials used in typical installations. Special treatment is given the subject of vibration isolation platforms designed for motors, fans and the like.

A copy of this illustrated brochure, "Sound Control of Mechanical Equipment," Number DS Series 275, may be secured by writing to Johns-Manville, Executive Offices, 22 East 40th Street, New York City.

Roots-Connersville Issue New Booklet

Bulletin 21-B-17 descriptive of VICTOR-ACME Rotary Positive Blowers has just been issued by Roots-Connersville Blower Corporation of Connersville, Indiana.

The power economies that are possible when moving varying volumes of air by the blowers, are illustrated by a diagram. Other operating characteristics of known, controlled volumes, positive air movement, freedom from internal seal or lubricant, are described, along with illustrations of the Types "SB" and "AFS" designs, on pages two and three.

A selection table, giving net capacities at listed speeds and pressures, is contained on page four.

Pittsburg Water Heater Corp. Announce New Low Consumption Models

Among the many signs of an upturn in the gas appliance business is Pittsburg's sales results for the first seven months of 1935 which exceed total sales for previous year.

The first step of the new management of the corporation has been to overhaul the production facilities and to bring them up to the highest mark of efficiency. Departments have been rearranged—new progressive conveyor assembly systems installed—manufacturing methods modernized throughout under the direction of Mr. D. Henry Bonner, President, who has applied the efficient manufacturing methods of the leading makers of automobiles insofar as they can be applied to water heaters. President Bonner was formerly associated with the Ford Motor Company in Detroit as manager of assembly operations for all of Ford's U. S. branch plants. For ten years prior he was in charge of manufacturing of all interior hardware used by General Motors in Fisher Bodies.

At the same time the engineering department has been busy under the capable direction of Mr. Chester Jones with Mr. Arthur LaCapria in charge of Pittsburg's laboratory. Mr. LaCapria was formerly associated with Professor Gordon B. Wilkes in conducting the M.I.T. tests on comparative Water Heating costs. The results of Pittsburg's new laboratory and engineering research are now presented to the gas industry in the form of two new water heaters giving new low consumption performances.

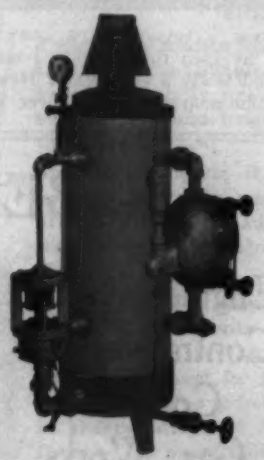
The manufacturer claims these low consumption performances based on tests conducted in strict accordance with the M.I.T. tests.

Save-Omatic—20 gallon storage heater 10,000 b.t.u. per hour burner—50 gals. of hot water per day or 1500 gals. per month using 535 b.t.u. gas with 100° F. water rise— monthly gas consumption 3370 cu. ft. The manufacturer claims economies exceeding those of the slow recovery type with twice the available hot water. Its design is streamlined, all protuberances are removed—all connections are made through the bottom where they are concealed by a removable base. A number of new developments in water heater design are embodied in this model.

The Watermatic—the faucet action heater—in similar tests, according to the manufacturer has shown low fuel consumption result—50 gals. of hot water per day or 1500 gals. average a month on 535 b.t.u. gas 100° F. water rise—3590 cu. ft. of gas per month. This model is thermostatically controlled and has a capacity of 4 gals. per minute.

Both these tests are said to show a lower operating cost for heaters of their respective types than any developed by the M. I. T. tests.

Pressing Machine and Steam Iron— BOILERS



P. M. LATTNER MFG. COMPANY
CEDAR RAPIDS, IOWA

A New Method of Water Heating

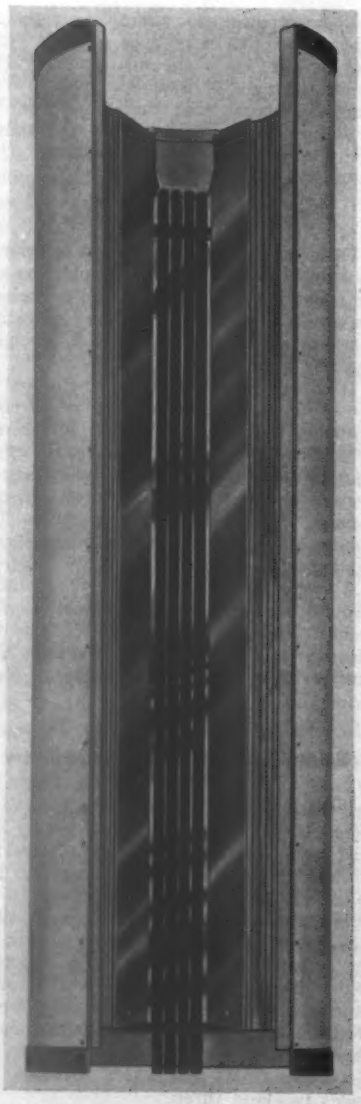
A revolutionary new method of heating water with gas through a new type of heater is announced by the Handley Brown Heater Company, Jackson, Mich. The new Gas Water Heater will be of value to the whole gas industry because it opens a vast untouched market for automatic gas water heating and with it a greater quantity of gas for domestic use can be sold. In 25 minutes with one of these new heaters, any gas fitter can convert a range boiler into a very efficient Automatic Storage Water Heater that is as attractive in appearance as a factory built heater.

In 1926, a new type of Automatic Gas Water Heater was introduced to the gas industry by the Handley Brown Heater Company. The new heater was very different from gas water heaters then in use. The heating flue consisted of an inverted U-shaped tube and the thirty gallon heater had only a 4500 B.T.U. input. Most gas heaters then had inputs of 20,000 B.T.U. or more. This pioneer low input heater found ready favor with gas consumers because of its low first cost and its unusually low operating cost.

For over four years the Handley Brown Heater was the only low input heater on the market. The idea they developed proved so practical that now there are fifty-seven models of low input gas heaters of other makes that have been approved by the American Gas Association Testing Laboratory.

The Handley Brown U-tube type heater opened a vast untouched market for the sale of domestic gas by lowering the cost of automatic water service to the consumer. There still remains a large market for automatic water heating service that can only be reached by further reducing the first cost of the water heater and holding the operating cost to a minimum. This is especially true in those sections where water conditions are such that high priced non-ferrous metal tanks must be used. Recognizing the need for a heater to enable gas companies to reach that class of gas customers, the Handley Brown Heater Company has developed and now offers a heater that will reach that market.

It took a revolutionary new type of heater to open the untouched market in 1926 and today a Gas Water Heater just as revolutionary as the pioneer Low Input U-tube Type Heater is here to bring automatic water heating service to a greater number of moderate and low income gas consumers.



This new heater transfers the heat to the water by reflection and the use of this principle of heat transfer is something entirely new in water heater construction. Highly polished, non-tarnishable metal mirrors are used to reflect through the sides of the range boiler, the heat generated by small gas flame at the base of the tank. This new heater has been very appropriately named MIRRO-SHELL. The utilization of the principle of reflected heat in the design of the MIRRO-SHELL HEATER makes in a few minutes at small cost a very efficient Automatic Storage Gas Water Heater out of the customer's present range boiler regardless of the type of fuel previously used to heat the water.

Water connections are not needed making for quick, simple and low cost installation. The MIRRO-SHELL need only be placed around the range boiler and a ¾" gas connection made and the customer has a fine appearing, well insulated, very efficient Automatic Storage Heater.

A surprisingly high over-all operating efficiency is obtained through this new method of applying heat to the range boiler. Costly and bothersome lining sediment and condensation troubles are eliminated. These have always been an item of great expense and trouble to the customer and to gas companies.

This heater because of its low cost and ease of installation can be readily sold by stores selling gas ranges or appliances and will prove a welcome new gas using appliance for gas company co-operating dealers. This heater's ability to give a great many gas consumers a desirable automatic hot water service at low cost, thereby increasing domestic gas consumption, will be of great benefit to the entire gas industry.

Charles R. Parker Now With Pittsburgh Equitable-Merco Nordstrom

Announcement has just been made that Mr. Charles R. Parker, former geologist and contracting driller in the mid-continent area has joined the sales force of the Pittsburgh Equitable Meter Company and its subsidiary, the Merco Nordstrom Valve Company.

Mr. Parker, who served in the navy during the World War, has a background of technical training and a wealth of field experience which should stand him in good stead in his new connection. He received his engineering education at Kansas University, later attending the University of Oklahoma to specialize in geology.

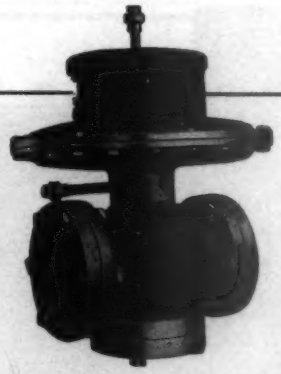
ISBELL-PORTER COMPANY

Engineers and Contractors for Complete Gas Works

I-P Co

Manufacturers of All Kinds of Gas Apparatus

NEWARK, NEW JERSEY



C-F

Dead-Weight Regulator

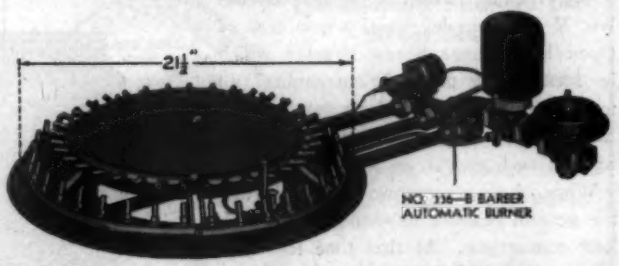
Pressures as low as two ounces without variation

A UNIFORM delivery pressure anywhere between 2 and 6 ounces as desired can be maintained with either natural or manufactured gas taken at any inlet pressure up to 15 pounds, by use of the Fulton Dead-Weight Regulator. Pressure will be unvarying throughout the whole range of flow. This regulator has no stuffing boxes, is highly sensitive as a result, and can be used either as a district governor or for individual service. Ideal for regulating gas pressures to gas engines. Sizes 3 inches and over have flanged connections, those below 3 inches, screw connections. For relieving line pressures below 6 ounces, the Fulton Dead-Weight Relief Valve is recommended. Ask for Bulletin 1629, also new general C-F Catalog.

THE CHAPLIN-FULTON MFG. COMPANY
28-40 Penn Avenue, Pittsburgh, Pa.

• *The Trend of the Times* •

is to BARBER BURNERS!



ARE you fed up with makeshift, improperly designed, meter-racing, gas conversion burners? Then it's time for you to join the growing procession of converts to Barber—the leading conversion burner on the market today.

Tailor-made to suit and fit the grate dimensions of round or oblong furnaces or boilers. Insures proper scrubbing flame action on side walls of firebox, the hottest fire per foot of gas. Equipped with Klixon or Baltimore Safety Pilot for positive and accurate control. Listed in the A.G.A. Directory of Approved Appliances.

Write today for New Illustrated Descriptive Bulletin and Revised Prices.

THE BARBER GAS BURNER CO.
3704 Superior Ave. Cleveland, O.

BARBER *Automatic* JET GAS BURNERS

• for Warm Air Furnaces, Steam and Hot Water Boilers •

More Economical Dry Box Purification with-

LAVINO GRANULAR OXIDE

Gives far greater purification for the dollar expended.

Requires no mixing with shavings or other carriers.

Is easier to handle and to fill boxes.

Gives about 4 times the present Box capacity.

Allows fouled material to be sold.

Write for literature, or ask one of our Purification Specialists to call—without obligation.

Can be used in your present boxes.

E. J. LAVINO and COMPANY
1528 Walnut St.
Chicago Philadelphia, Pa. Pittsburgh

Using CHACE *Exclusively*

THERM-O-LECTRIC CORP.
DETROIT, MICH.

Today every modern iron has thermostatic (automatic) heat control; it prevents over-heating and lengthens the life of the iron.

Chace Thermostatic Bimetal is employed by the majority of iron makers because of its absolute reliability.

Wherever temperature is a factor, Chace Bimetal will give you dependable automatic control at low cost without any need for future service. May be purchased in sheets, strips or forms finished to specifications.

W. M. CHACE VALVE CO.

New Open End Flange Screw Bracket

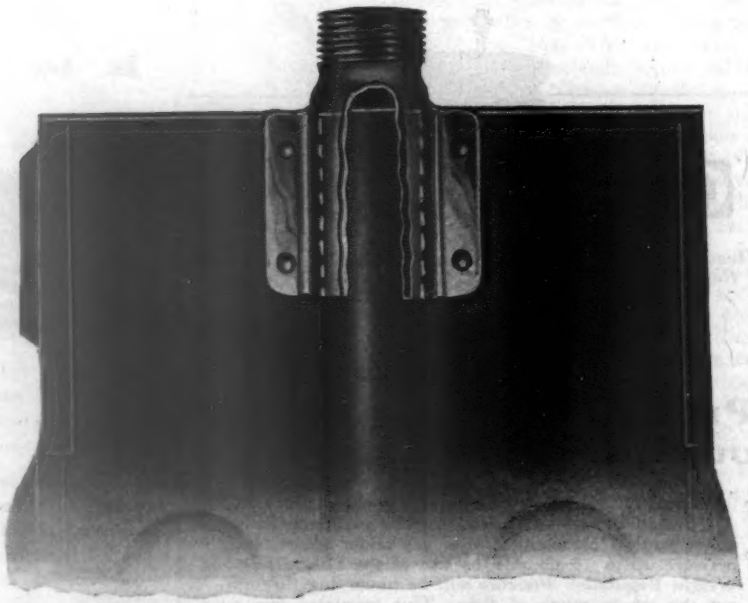
The Lambert Meter Company, Brooklyn, N. Y., have developed a new type of Open End Flange Screw Bracket which is intended for old style tin meters (all makes) that have the short tube screws and long tin side pipes as a protection against neck and screw leaks.

When these meters were built it was the general practice to connect them with lead connections. At that time this type of meter construction was adequate. Now, however, when all meters are connected with rigid malleable iron or brass connections these meters easily develop leaks around the necks of the screws because of the tremendous strains put on them in connecting them up.

With this new Lambert Flange Screw Bracket you can convert your old style meter into a modern meter as far as the strength of the screw and avoidance of leaks around the necks is concerned.

It is sturdily built of solid bronze and heavily tinned—containing four (4) rivets which are located above the table and backplate.

The method of application is as follows: The old short tube screw is unsoldered from the meter. Then the extending portion of the long tin pipe is either snipped off or hacksawed off. Next the bracket is laid on over the long tin pipe and tacked in place—holes are drilled in the side through the holes in the bracket, which is then riveted to the side. Soldering and sweating follows and the job is finished. Actual practice indicates the time for the entire job, per side, at approximately nine minutes.



Strength of this construction aside from the heft of the bracket lies in the location of and rivetting at the four places—whereas the soldering and sweating carries no strain, thus acting only as a means to make the bracket gas tight.

It is simple, sturdy and economical. It is easily applied requiring no special training or tools. Any meter repair shop mechanic can apply it. It is not necessary to take off cases to rivet the bracket on.

There are more than 400 styles and sizes of Hays Double Seal Connections to choose from. Write for 24 page catalogue.

GAS TIGHT
Copper Pipe Joints

HAYS Double Seals are used wherever copper pipe is used. The Double Seal feature—a 45° seal plus a 90° seal—makes a connection that is gas tight without the use of any sealing agent. Double Seals are approved for Petroleum Products and City Gases by Underwriters' Laboratories. In addition, they have successfully passed the severe tests of many other laboratories.

Tell us your piping problem and we will send complete data on HAYS Double Seals.

HAYS MFG. CO. ERIE, PENNA.

Specify HAYS DOUBLE SEALS

Gas Model Home for Detroit

To demonstrate the superiority of gas in its many applications for domestic use, the Detroit City Gas Company recently broke ground for a model gas home in the northwest section of Detroit. This activity is in keeping with the better housing movement throughout the country.

This gas model home will conform to specifications set up by the Federal Housing Administration—a home which will appeal to the average man, adequate to meet his requirements.

All modern facilities will be part of this home. Needless to say, practically all the appliances will be operated by gas—gas-fired furnace, Electrolux refrigerator, gas water heater, incinerator, ironer, clothes drier and modern gas range.

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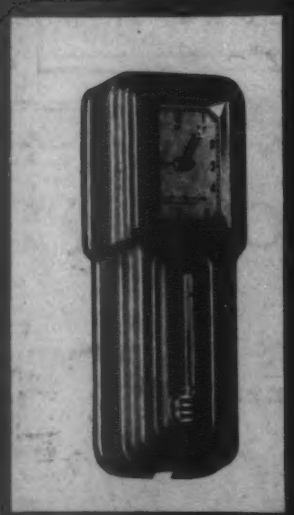

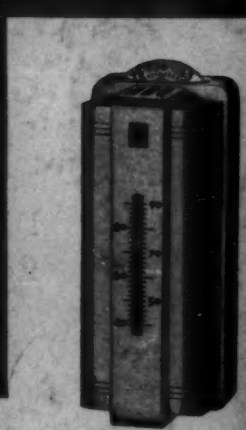

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